electron user

Vol.1 No.5 February 1984 £1

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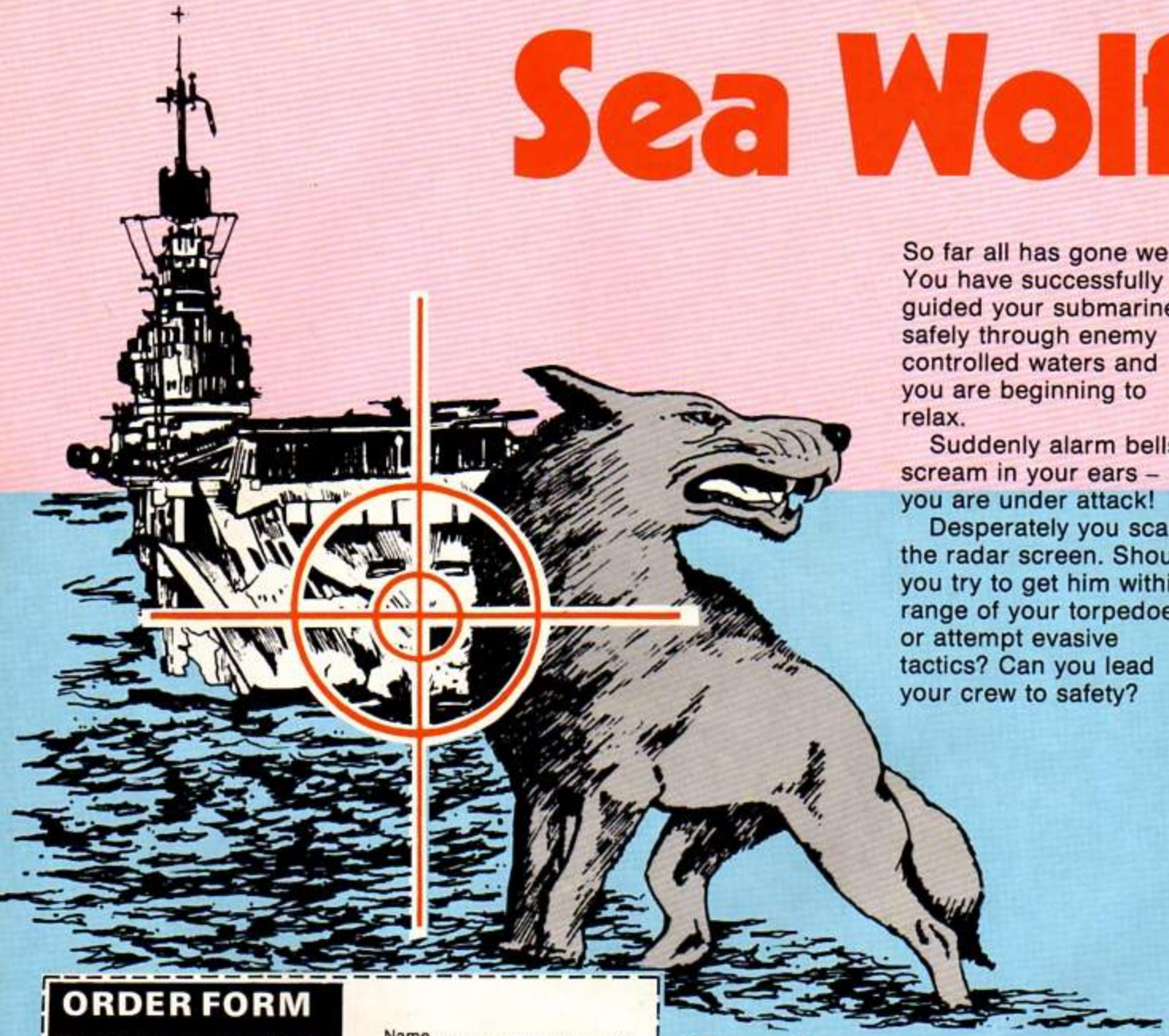

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Electron Eddie-torial

WELCOME to the first separate issue of *Electron User*, the new totally independent magazine written by and for enthusiastic users of the Acorn Electron.

It's nice to be with you after so long hiding in the centre of our "big brother," *The Micro User*. Not that we're not grateful but it's great to be talking to our sort of people and not the snooty BBC Micro owners.

We're starting off with a lot of good intentions and we want you, our readers and – hopefully – our contributors, to keep us to them.

Our aim is to provide a thoroughly professional magazine devoted exclusively to developing every aspect of this exciting new micro.

This is, of course, easier said than done. But with the writers we've got already – and the contributors who we're sure are out there somewhere, slaving over their Electrons – we aim to produce a magazine that's both fun to read and satisfying to use.

Our belief is that there is nothing in micro computing that cannot be understood if it is explained well enough.

Anyone who can follow a knitting pattern or fill in the treble chance is capable of programming a micro. And would enjoy doing it.

We also believe that micros, and the Electron in particular, are fun and there's no need for them to be written about in a boring manner.

Most people look on the micro as their hobby and want to enjoy it. Here at *Electron User* we aim to help them to do this.

So, whether you're an expert programmer or a complete novice, you'll find lots to interest you among the many articles written by our team of experts. Quite a lot of you will be joining those experts – perhaps sooner than you think.

And, since we believe that people who have the taste to buy an Electron (and *Electron User!*) wish to do more than unthinkingly type in listings, you'll find that we'll be covering the whole range of Electron applications.

Even at this early stage in its life, software and hardware add-ons for the Electron are developing fast. We'll be keeping you in the forefront of these developments and explaining what they're all about.

We'll be having a comprehensive series of articles aimed at teaching beginners how to use and enjoy the Electron. Month by month it will build up into an indispensable guide to the micro and its uses.

And it won't just be one-way traffic. You're the readers . . . tell us what you want and we'll try to do it.

But we're not clairvoyant, if you want *Electron User* to cover something then we need you to tell us.

Not only that, but we want your contributions, ideas, criticisms and, most especially, shared enthusiasms.

So write to us, please. Our address is:

Electron User,
Europa House,
68 Chester Road,
Hazel Grove,
Stockport SK7 5NY.

Keep us informed and we'll make sure the magazine reflects your interests. It should do because it will be YOUR magazine, produced by Electron users for Electron users.

We look forward to hearing from you.

Pete Bibby

Formatting made easy

AS you might have found out by now, it's all too easy tc make mistakes when you're typing in listings. Anything that helps to make life easier is worth its weight in gold.

Of course, to us at *Electron User* no expense is spared in making things easier for our readers. Many's the time we've heard the editor say "No expenses!".

So to make things easier when you're typing in programs, the listings in *Electron User* are produced using a formatter program that makes them clearer to read.

What is a formatter program, you might ask?

All it is is a program devised by Dr Jim Notman, which splits complicated multiple lines into nice simple parts, one below the other.

Multiple lines are used to save memory space in programs.

Suppose you had a program that, for reasons best known to yourself, printed three blank lines. This could be done by:

```
10 PRINT
20 PRINT
30 PRINT
```

but it takes three lines and is quite wasteful of precious memory.

It would be better to use a multiple line such as:

```
10 PRINT:PRINT:PRINT
```

in which the three commands are all on one line (line 10) separated by colons (:).

Programmers use this technique a lot. But it does lead to complicated lines with a lot of commands all strung together with colons. You end up with things like:

```
10 REPEAT:PRINT "HELLO"
   :UNTIL FALSE
```

and worse.

The formatter splits these into commands and puts each one on a different line. So line 10 becomes:

```
10 REPEAT
   :PRINT "HELLO"
   :UNTIL FALSE
```

Notice that there is still only the one line number.

You type in a line like this by entering it just like you would a normal program line but ignoring the spaces between the last letter or number of a command and the colon below it.

You could, if you wanted, put in these spaces, but your program would soon run out of room.

One most important point to remember is that you don't press the Return key until you get to the end of all the multiple line. This is when there are no more colons and commands following.

The best way to be sure of this is not to press Return until you come to the next line number.

It's much easier to do than to talk about, so try entering this:

```
10 PRINT "x"
   :PRINT "x"
   :PRINT "x"
```

Remember to go straight from the end of one line (in this case an inverted comma) to the colon at the start of the next without putting in spaces. And don't press Return until you get right to the end.

Doing this to the formatted listing above results in:

```
10 PRINT "x":PRINT "x"
   :PRINT"x"
```

when you've pressed Return.

And that is all there is to entering the specially formatted listings. It's quite simple to do and, once you've got the hang of it, it makes typing in listings much easier and quicker.

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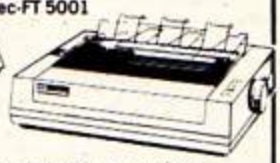

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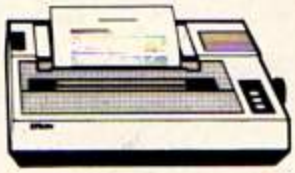

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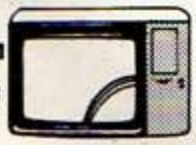

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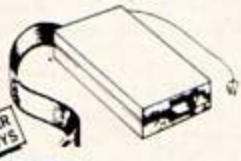

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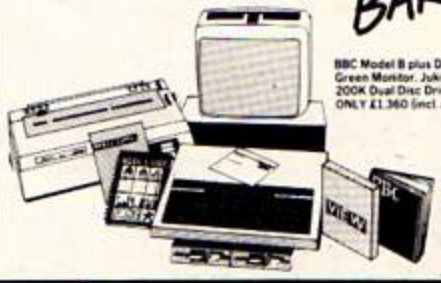

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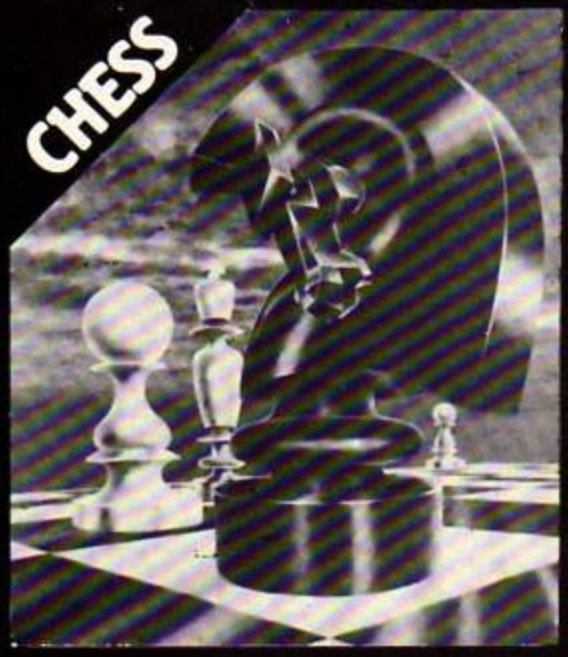

CHESS

Excellent use of the high-res graphics help to make this the most flexible chess game available. A choice of hundreds of different skill levels control the playing strength. This game has been continually updated over the past few years and this later version incorporates a host of new facilities, including the ability to: change the board and piece colours; replay a game, move by move; change levels whilst playing; ask the computer to suggest a move; force the computer to make a move at any time; save a game on tape or disc; blitz play within a time limit; mate in 2, 3 or 4 moves; castle and en passant.

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LOGO 2

One of our most popular programs to date. This is not a game, but an introduction to the LOGO graphics language that has become so popular in schools. It incorporates the 'turtle' graphics and many other features common to all LOGOS. Fascinating patterns or other graphics work can be built up very easily using the set of inbuilt commands. The command set can be extended by adding new 'words' to its vocabulary based on the existing set. Logo 2 can be used as a very simple graphics aid for young children, but it can incorporate more advanced ideas — defined procedures, sub-routines, loops and even recursive programming. Supplied with full documentation.

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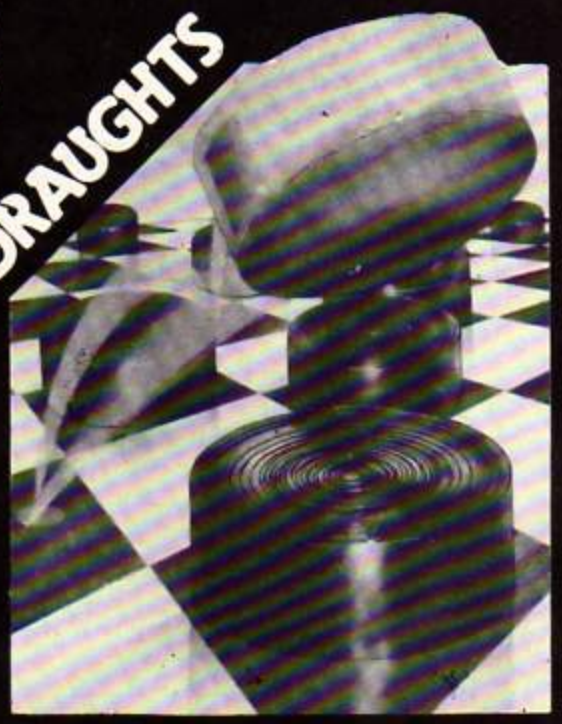

DRAUGHTS

From the same author as our best selling Chess program, this game incorporates many of the features of that program — various skill levels, save a game to tape, replay a stored game, etc. etc. A high resolution colour display (the user may change the colours) and an option to choose the rules of play make this game extremely flexible.
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electron user NEWS

WE'VE GOT THE USER TAPED!

WE'RE here at last! *Electron User* has gone independent and started life as a magazine in its own right.

Published each month, the magazine will be available from your local newsagent and through subscription.

Also we aim to follow the policy of our "big brother", The Micro User, and produce a cassette tape each month.

On it will be all the major programs that appear in that month's *Electron User*. This should save you all some typing!

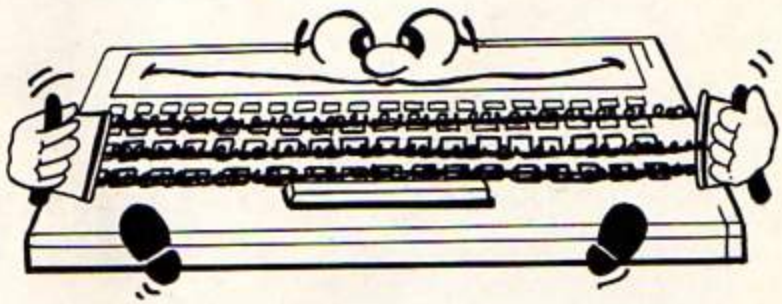
Each month, too, we'll be bringing you all the latest news on the fast growing world of the Electron.

Games, in-depth reviews, features – all you've come to expect of *Electron User* and more.

We intend to become the next best thing to your Electron!

THE EXPANDING ELECTRON – THAT'S THE NEXT STAGE

NEWS of the first official hardware add-ons for the Electron comes from the new "Acorn Guide to the Electron". This sees the Electron as the centre of a modular expansion system.



According to the book, the first expansion module for the Electron will contain:

- An analogue to digital input (which can be used for joysticks).
- A Centronics printer parallel interface.
- Two sideways ROMs.

Apparently it may also contain a connection for an RS232 interface.

No price has been given yet and an Acorn spokesman could not give an indication of when the module may be released.

In fact the Acorn spokesman wondered where the information about the module had come from!

Nor is there any indication of what the ROMs will be, though a word processor and another computer language seem high on the list of possibilities.

The book also states that the second processors promised for the BBC Micro will also work with the Electron. These will increase its power and speed.

Apparently a future Electron expansion module will contain the Tube, the high-speed device which allows communication with these second processors.

Also promised are disc drives and speech synthesis chips for the Electron though, again, no date or price is mentioned.

A Cloud blows over the Scottish border

FROM Scotland comes news of yet another firm producing hardware add-ons for the Electron – Micro Research of West Lothian.

They have developed a "black box" – the Cloud – containing a Centronics printer interface, an A/D converter and joystick ports. Also double use I/O ports are available to add to this.

At present MRL aren't yet making the Cloud though a spokesman told *Electron User* that it is fully developed.

W.H. Smith are evaluating a Cloud and when MRL have an answer they will decide on production.

'TOP TEN' TAKE THE LEAD

MICRO Power of Leeds have taken the lead in producing Electron software, with ten titles now available for the new micro.

These include the "old" favourites for the BBC Micro, such as Escape from Moonbase Alpha and Killer Gorilla, as well as their latest releases such as Positron.

Programs like Moonraider have had to be completely re-written due to the lack of hardware scrolling on the Electron.

Others have had to be modified because of the difference in speed between the BBC Micro and the Electron.

They also plan to release a further 20 titles for the Electron. These will not only be the games programs for which Micro Power are well known, but also educational programs and utilities such as Draw (reviewed this month in Software Surgery – see Page 22).

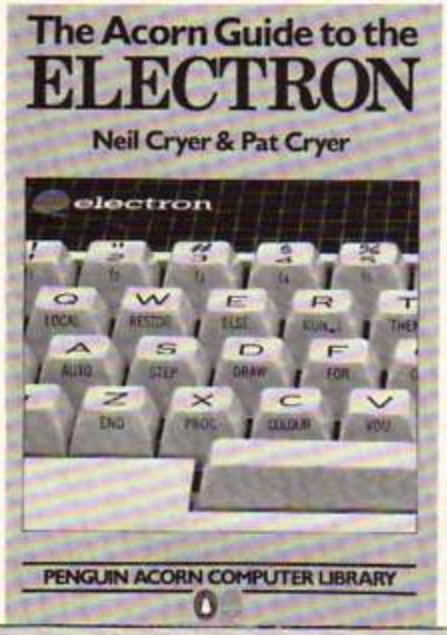
Confidence in the Electron software market is so great that W.H. Smith have placed initial orders with a retail value of £400,000 for Micro Power's first ten Electron titles.

MORE PREDICTION

ONE of the many stands doing a brisk trade in Electron software at the BBC Micro User Show was Glengary Soft of Essex.

Their best selling line was Forecaster, a football pools program which has seven different ways of predicting the results.

On the next stand Golem were surprised at the demand for their Electron educational programs. "We're selling a lot of software for it", said a delighted standholder.



Penguin joins the team

ACORN, the Cambridge based producers of the Electron, have joined with Penguin, the paperback publishers, to start the Penguin Acorn Computer Library.

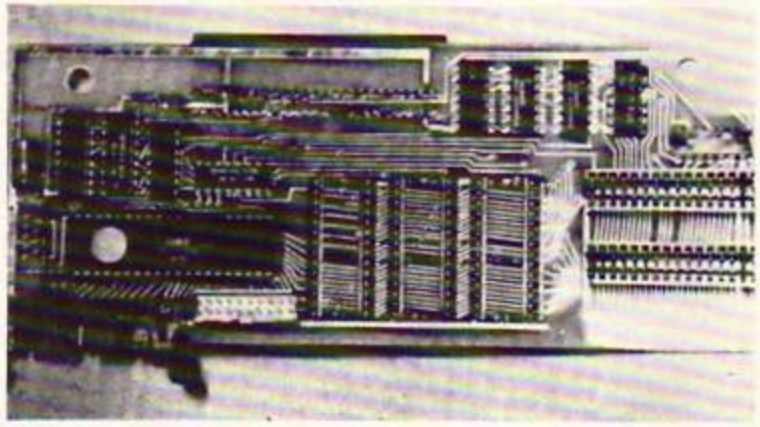
Two books have been issued by the new venture and both are written for the Electron.

The first is grandly titled "The Acorn Guide to the Electron" and is a well-illustrated introduction to the machine for the non-technical.

The second is called "Games and other Programs for the Acorn Electron". This is a book of listings containing the usual action and logic games.

But it also has utilities and graphics programs.

Eight more books are planned for 1984. These will include one about writing arcade games and another on creating adventure games.



Piggyback interface for Electron

THE race to produce the first hardware add-on for the Electron appears to have been won by Solidisc of Southend.

At the BBC Micro User show they were demonstrating their General Purpose Interface (GPI) for the new machine.

The GPI is a cartridge, measuring seven inches by three, that fits onto the back of the Electron. It combines a Versatile Interface Adaptor (6522 VIA) and a complete sideways ROM/RAM system.

The aim is that the sideways ROMs will deal with discs, printers, word processors, different languages and electronic spreadsheets.

The cartridge also provides facilities to connect a Centronics-type printer, such as an Epson, and an eight directional joystick, such as the Atari.

There is also an eight-bit parallel user port, sockets for three sideways ROMs, and two cartridge slots for autostart games accepting Solidisk's mini-ROM cartridges and their 16k sideways RAM unit.

All of this helps the Electron rival the BBC Micro in its potential and Solidisk don't aim to leave it there.

Already they plan a mass storage system for the Electron based on floppy tape, like the Sinclair microdrive.

Their engineers are also working on a Z80 second processor, and a 16 bit INTEL 80186 processor.

They are even looking at a way of using the Electron as a low-cost terminal for minicomputers or mainframes.

With all this the Electron looks like a micro that's set for expansion in a big way.

Make light work of listings!

All program listings in *Electron User* have been put on tape – to save you the chore of keying them in yourself.

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Part One of PETE BIBBY'S introduction to programming

Let's start at the

very beginning...

ARE you a computer genius? Do you know all about RAMs and REMs and ROMs? Have you read and understood the User Guide that came with your Electron and could you tell it a thing or two?

If that's an accurate description, then don't bother reading any further as this series of articles will bore you stiff.

However, if you're the kind of person who knows nothing about the Electron and how to use it but would like to know more, then read on. All (well, a lot, anyway) will be revealed.

THIS is going to be very much a "hands-on" approach to Electron Basic. So before we start you'd better have your Electron ready to get your hands on!

The first thing to do is to attach your Electron to the TV set and switch everything on. The User Guide that came with your computer tells you how to do it. Now the TV screen should be showing something like the one on the illustration opposite.

The screen tells you that the micro is an Acorn Electron (just in case you'd forgotten what it was). The word BASIC just tells you what language you must use to get the brute to do what you want.

That ">" you see is the prompt. This shows that the micro is waiting for you to type something in telling it what to do.

That annoying flashing line is the cursor. This tells you where the next letter you type in at the keyboard will appear on the screen.

You can gather from this that, at this stage of the game at least, whatever you type in at the keyboard will appear on the screen.

Don't take my word for it – have a go for yourself. Type in some letters and see them appear on the screen.

In fact don't take my word for anything in this course. Try it out for yourself and see if it's true.

Not that I'll be deliberately lying to you, but even writers in *Electron User* can be fallible!

Also you'll find that the practical experience will reinforce what I tell you here and help give you confidence.

Anyway, by now the screen should be full of letters and words that you've typed in. You'll have probably noticed that the letters that appear on the screen are all capitals.

This is the normal state of affairs when you switch on (or after you've pressed the key marked BREAK).

If you want small letters then you have to press the key marked SHIFT at the same time as the letter key.

Don't worry if the keyboard looks a little daunting at first. You'll soon get the hang of it.

If you want to know more about how the keyboard works then have a look at Trevor Roberts' article about it on Page 34. But not until you've finished this one!

One of the keys that is important, and one we will be using a lot in this lesson, is the key marked RETURN. You'll find this on the right of the keyboard.

This is a very important key indeed. You can type away on the letter keys to your heart's content but the Electron won't take any notice of you until you press the RETURN key.

Try it now. Don't worry about what you've typed in, you won't hurt your Electron. Press RETURN.

What happens is that the prompt moves down to the next free line, with the cursor flashing away merrily awaiting some more input.

'Input' is what you type in and in this case was almost certainly rubbish.

You'll also – unless you happened by chance on an acceptable word – get a message such as:

```
Mistake
```

or

```
No such variable
```

You will get to know these messages all too well during your computing career!

What's happened is that pressing the RETURN key was the signal for the Electron to have a look at what you'd typed in and see if you've told it to do anything.

What it got was almost certainly rubbish and it told you so, in no uncertain terms.

The problem is that although the Electron is a very powerful machine and you can tell it to do all sorts of things, you have to have the right words.

If you want you can look on them as words of power that make your Electron obey you.

The collection of these words and the ways they are used is called the computer language, Basic. There are other languages for computers. But since Basic is the one that the Electron understands and expects, we'll stick to that.

The first of these Basic words we will use is also one of the most important – PRINT. As you might expect this prints something, usually by displaying it on the screen.

Type in PRINT and press RETURN. What happens?

The answer is nothing much. The prompt and cursor

just move down a line. Not very exciting was it?

At least the micro didn't throw back "Mistake" at you, which shows that it's willing to accept PRINT as a valid command.

Actually, you've just given your first instruction to the Electron and it has obeyed you.

What has happened is that pressing RETURN has told the micro to have a look at what you typed in and, if possible, to do what it says.

The Electron recognises PRINT as a Basic word and obeys it. PRINT by itself just "prints" a blank line on the screen and this is what happens. Try it again and see.

One point to watch out for is that the word PRINT is in capital letters. Typing in Print and pressing RETURN won't work. The Electron will only obey Basic keywords that are in capital letters.

Also it will only obey them if

→

'It's powerful – but you need the right words'

From Page 11

the spelling is exact. You may know that when you entered PAINT and meant PRINT, but the Electron won't accept it.

You will be glad to know that you can do a lot more with PRINT than just display empty lines on the screen. For instance, you can use it to give you the answers to any maths problems you may have.

Suppose you wanted to use your Electron to add 2 and 2. All you would do would be to type in:

```
PRINT 2+2
```

and press RETURN. The answer will be displayed on the screen. (I'm not telling you what it is – you can find out for yourself!)

When the micro comes across something like 2+2 it automatically adds it up. What the PRINT keyword does is to command the micro to "print" the answer onto the screen.

Notice that 2+2 isn't displayed. It's the result of the addition that appears on screen.

Try a few more additions such as:

```
PRINT 43+56
```

or

```
PRINT 72+115
```

You can also use the PRINT command to give you the results of subtractions, multiplications and divisions. Have a go at:

```
PRINT 116-47
PRINT 8*4
PRINT 8/4
```

Notice that for division we use the "/" sign and for multiplication we use the "*". These are the signs that the Electron will recognise as being part of the Basic language and it will know what to do.

If you try to multiply 4 by 8 with:

```
PRINT 4x8
```

the Electron doesn't know what you're talking about. It will display the first figure, in this case 4, and then produce an error message, "No such variable".

This is the Electron's polite way of telling you that you're talking rubbish!

As I said before you'll come across a lot of messages like this in your computing career. Don't be put off by them. They are there to help you even if it doesn't seem like that at times.

Anyway, we can do more with PRINT than just do sums. We can use it to put our own messages up on the screen. Enter:

```
PRINT "HELLO"
```

and you'll see HELLO flashed up on the screen.

You'll find the inverted commas on the key with 2 on it. Don't use the apostrophe on the 7 key twice or the Electron will get confused!

Now try:

```
PRINT "Hello"
```

and

```
PRINT "hello"
```

and you'll see that the Electron can tell the difference between upper and lower case letters and displays just what you put in.

The rule is that the Electron will display on the screen exactly what follows the print statement if it is enclosed in inverted commas, or quotes.

You'll notice that:

```
PRINT "HELLO"
```

just put HELLO on the screen, not the inverted commas on either side. You may be wondering why we bother putting them there if the Electron doesn't print them.

The answer is that the Electron doesn't ignore them.

In fact, they're very important. Try leaving one out and see what happens.

The first set of inverted commas after PRINT tells the Electron to print out everything that comes after it until it reaches the second lot of inverted commas.

Anything between the quotes is reproduced exactly on the screen. Try:

```
PRINT "anything"
```

and

```
PRINT "Hello again"
```

and you'll see that the micro uses the inverted commas as markers and displays whatever it finds inside them. Even the spaces between the words.

What comes inside the quotes is called a string – a word that will become very important later on in your computing career. However for the moment we'll just use it to put messages on the screen.

Incidentally, it's not only letters and spaces that can make up strings. You can have numbers as well. Try:

```
PRINT"123"
```

and

```
PRINT "3ac4"
```

The Electron prints out everything between the quotes, just as before. Can you see why:

```
PRINT 2+2
```

and

```
PRINT "2+2"
```

have different effects on the Electron?

In the first PRINT there are no quotation marks surrounding the sum so that the micro adds them up and displays the answer.

In the second case it reads the inverted commas and PRINTs out everything between them, the plus sign included.

The string marked by the quotes is treated as a whole and printed out in one lump, not added up.

Try out the print command yourself with different sums and strings. Send yourself messages. Is there any limit to how long can they be?

Also, is there any difference between the places on the screen where numbers appear and the places where strings appear?

Have fun experimenting. It's the best way to learn.

Anyway that's all for this lesson. You've probably noticed that at the moment we're typing things in, pressing RETURN and the computer does it straight away.

This is good fun but not much use in practice. Doing a

large calculation this way or repeating a message over and over would take ages.

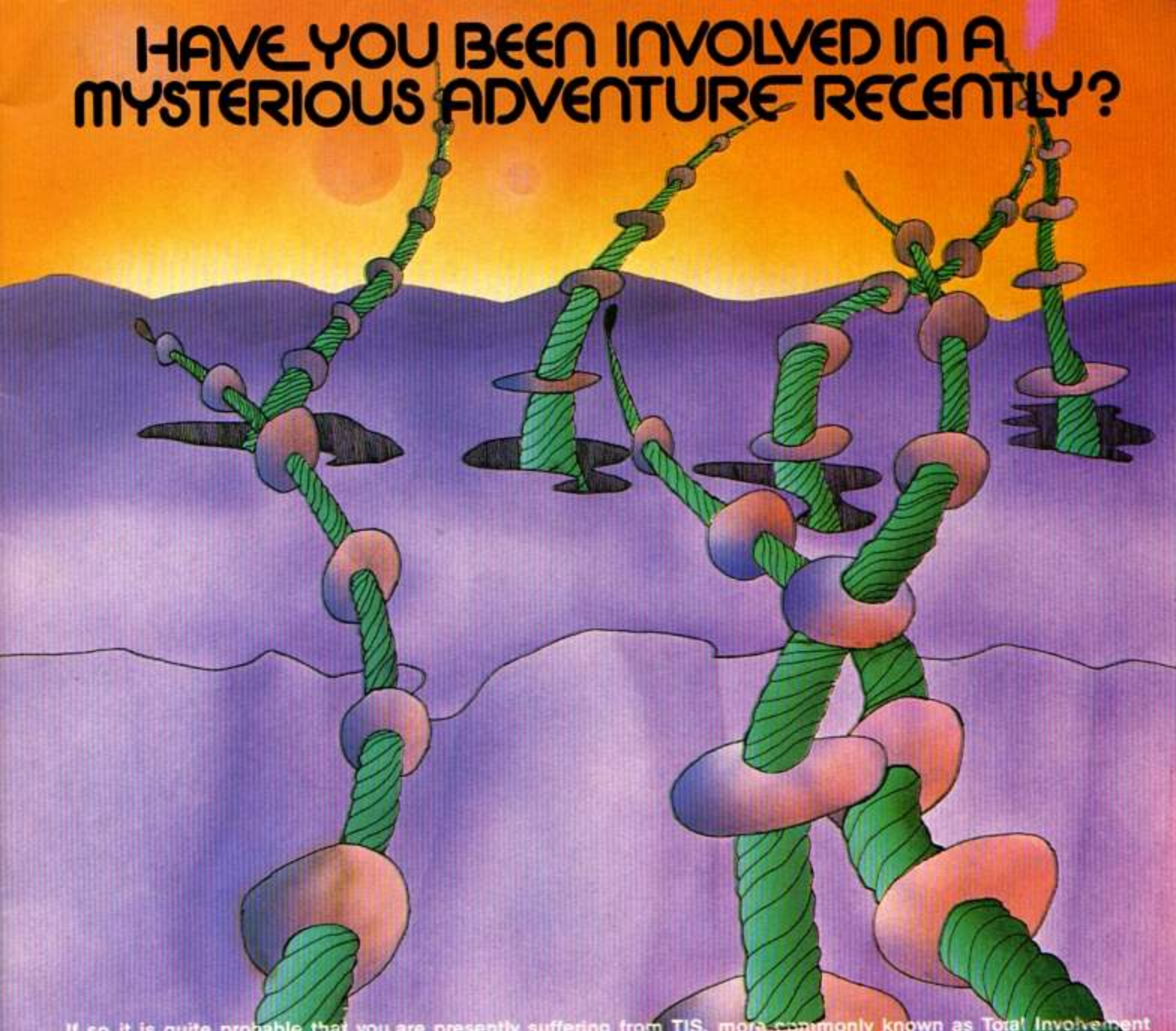
It would be much better if we could give the Electron instructions on how to do the sum and let it get on with it.

This is exactly what a computer program is, a step by step series of instructions which tell the micro what to do and how to do it.

We'll start to write programs next month when we'll also be adding a few more Basic commands to the one we already know – PRINT.

Pete Bibby

HAVE YOU BEEN INVOLVED IN A MYSTERIOUS ADVENTURE RECENTLY?



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```
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126,0,0,-126,126,126
SOUND 1,1,157,129
```

TILT

```
ENVELOPE
3,2,-25,-80,-6,15,0,0
126,0,0,-126,126,126
SOUND 1,3,156,27
```

HANGOVER

```
ENVELOPE
3,1,-36,-93,-9,11,0,0,
126,0,0,-126,126,126
SOUND 1,3,148,222
```

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As the shuttle only seats two, you have to make four separate trips.

What makes it harder is that as soon as you take off from the pad it disintegrates. (Well, they are temporary!) This means you have to head for a different pad for each explorer.

Also you have to leave the ship on autopilot and it won't slow down to help you when you return.

And, of course, there are the asteroids. Some of them are stationary and others, more devious, hurtle along in low, fast orbits.

It's not easy but it is fun. And, like all good games, as you get better at it, it gets harder.

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PROCcrash	Draws the explosion when the lander crashes.
PROCdisplay	Draws up the screen display.
PROCchars	Sets up the user defined graphics.
PROCfall	Draws an explorer plunging back down to the moon.
PROCinst	Displays the instructions.

Full listing starts on Page 54

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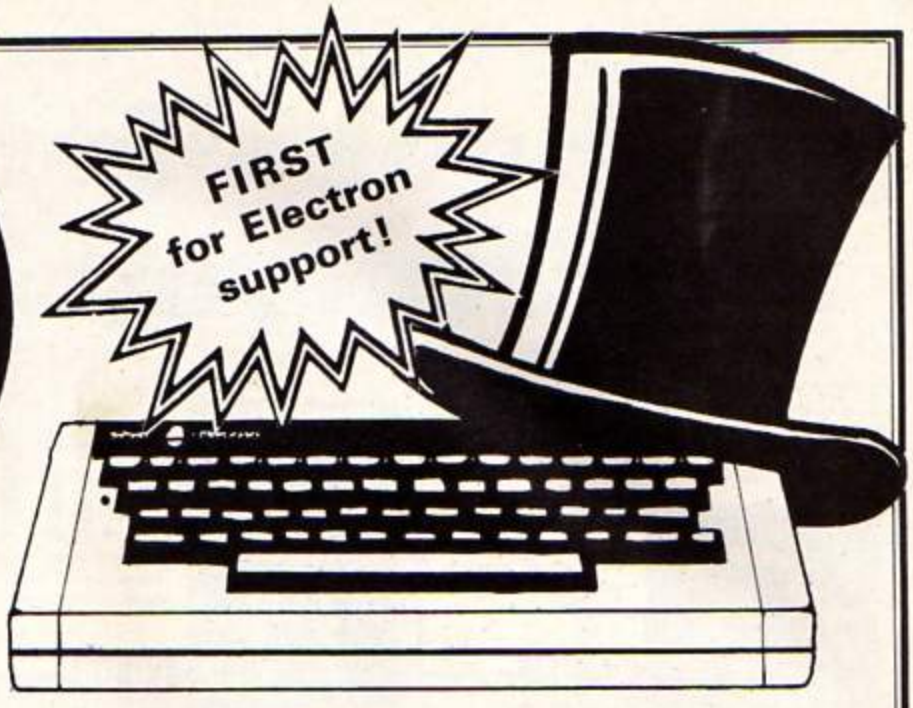

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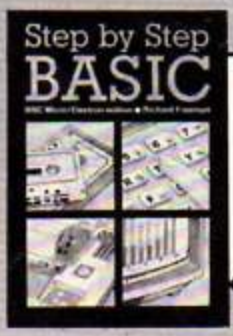

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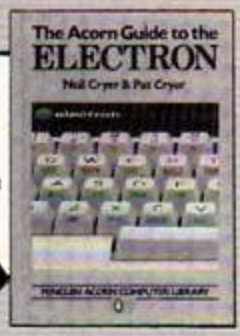

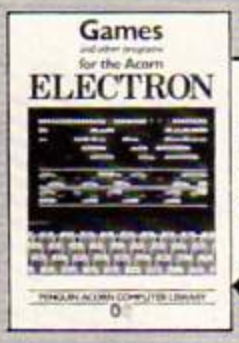

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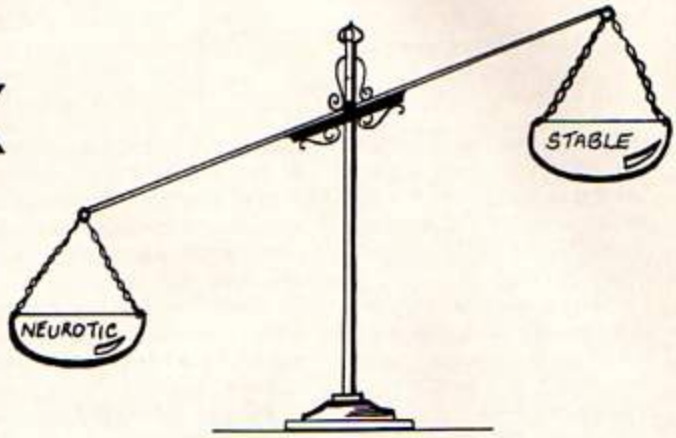


WHAT MAKES YOU TICK?
Third Program

PROBABLY the most fascinating person I know is me! I can speak for hours and hours on the subject and still not get bored. Or run out of things to talk about!

And now "What Makes You Tick?", a new piece of software from Third Program, has helped me find out even more about myself.

Won't my friends be fascinated when I tell them?

Trying to be scientific about the human personality is a difficult business, as many a psychiatrist and clinical psychologist will tell you.

Even so there are two measures that help to provide a rough and ready guide, and the program uses both of them.

The first is the scale of introversion as opposed to extroversion. Put simply, this means whether you're shy or outgoing.

The second scale measures whether you are emotionally stable (placid) or neurotic (anxious, easily agitated).

This may sound a bit dry and academic but it's not at all. In fact it's fascinating!

You run the program and your micro asks you 50 questions on seemingly unrelated subjects, one after another.

You're supposed to answer them as quickly as you can.

This is probably because if you think too much about the answer you'll tend to give one that may be an improvement on the truth!

At the end your answers are analysed and you're shown where you appear on the two scales.

While the program makes no claim to completeness it is amazing how accurately it assessed people I've tried it out on.

Not only that but they all enjoyed using it. Maybe I'm not the only one to find himself fascinating.

Dare I say that it could be used to break the ice at parties? Certainly it tells you a lot about people, even if it's only their reaction to the program.

In fact I was the only person it was wrong about. I'm much more calm, collected and emotionally stable than it says I am.

And if it doesn't change its opinion of me I'll start sulking!

Peter Gray

If cursed by commas, why not take a lesson from the Puncman

PUNCMAN
Chalksoft

PUNCMAN is a software package containing two programs that aim to help children from the age of eight upwards learn elementary punctuation in an enjoyable way.

Puncman, a sort of educated Pacman, writes a short story on the screen and a character called Nosher swipes the punctuation marks.

In Puncman 1 it's the capital letters and full stops that he takes. With Puncman 2 he becomes bolder and takes the commas and question marks as well.

The pupil has to help Puncman replace them all correctly by guiding him, using the cursor keys.

There are seven stories in each game, each of a different level of difficulty. A good feature is that you can choose the story level you want without having to go through the others.

One criticism is that it would be nice if you could jump back to the instructions from the game. It would also be nice to have the option of varying the speed of Puncman who might be too slow for some children, too fast for others.

Having said that, it's a nice program, well written and instructional.

Nigel Peters

Turtle graphics made simple

DRAW
Micro Power

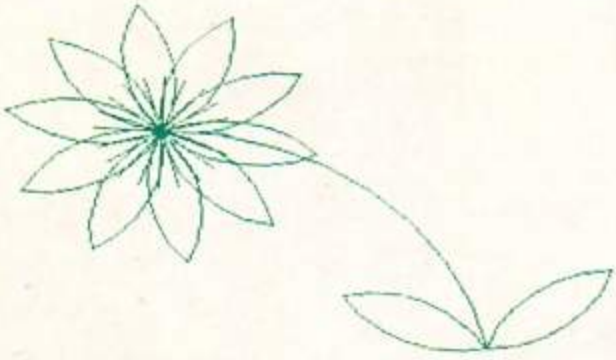
THE blurb inside the cassette box tells you that Draw is "an implementation of a sub-section of the LOGO language, principally its turtle graphics". Offputting isn't it?

I had two or three programs to review and left this one until last as it sounded so deadly dull. This was a mistake, as I soon discovered.

I loaded the program and turned to the tutorial section of the excellent little manual that comes with the cassette. This led me through all of the programming techniques available with Draw.

Written simply and clearly, it was a pleasure to use, unlike some of the other manuals I've come across.

By the time I'd read and worked through it on my Electron, Draw wasn't offputting, it was fascinating.



At one level the program allows you to produce pretty patterns on the screen, quickly and easily.

At another level it introduces the beginner to the basics of programming using a simple graphics-orientated language.

The fact that it is so much fun to use encourages experiment and learning.

The whole thing is menu-driven, which means that your Electron gives you a series of choices and you can take your pick.

This allows you to get any of the commands by one or two keystrokes, making the program very pleasant to use.

It's educational, it's fun and it's easy to use, being one of the nicest programs I've come across in a long while.

If you're looking for something that's both out of the usual and entertaining then Draw might just be it.

Trevor Roberts

Auto repeat

At the risk risk risk risk of repeating oneself...

DID you know that you can adjust the way that the keys auto-repeat? Maybe you don't know what auto-repetition is?

If you don't, just hold down one of the keys. The Electron will print the character on it and, after a short delay, if you keep the key held down will keep on printing it. That is the auto-repeat facility and it can be quite useful.

Sometimes, however, it can be a bit of a nuisance. Imagine a child or a disabled person who cannot get his finger off the key fast enough.

The screen could fill up with unwanted characters very quickly. They would also find deleting the mistakes difficult.

Happily, there are two ways of adjusting the keys using the commands *FX11 and *FX12.

When you enter these into the Electron they tell the operating system to change the way the auto-repeat is set up.

*FX11 tells the micro how long the key must be held down before it starts to repeat. It has to be followed by a number that sets out what you want to happen.

*FX11,0 switches off the repeat altogether. If you follow *FX11 with a comma and then a number, the micro takes that as the number of centiseconds delay before the repeat starts.

A centisecond is one hundredth of a second.

*FX11,10 tells the Electron that the key has to be held down for 10 centiseconds before it starts repeating.

You can also choose how fast the Electron prints the characters after the key has started repeating with *FX12 followed by the appropriate number.

*FX12,20 means that the delay between the appearance of each new character will be 20 centiseconds.

*FX12,1 sets the delay to one hundredth of a second and the letters appear at a phenomenal rate. This is great for taking the mickey out of someone!

Finally, entering *FX12,0 will set the keys back to the way they were when you switched the Electron on.

Or you can just hit the Break key if nothing else works!

You can count on the Electron to provide the answer

CALCULATOR is a simple program that turns your Electron into a powerful adding machine in just eleven lines.

In fact it's really only nine lines, as the first two are what is known as REM statements. These are only there to give information to human beings.

The Electron reads the line up to the REM, then ignores the rest of that line and moves on to the next line number for another instruction.

In this case it would take a look at lines 10 and 20, ignore them and only start to do something at line 30 when CLS tells it to clear the screen of any display that may be on it.

Line 40 may seem a bit pointless, as it just makes a variable **total** equal to zero.

However, **total** is needed later on in the program and has to be given a value to start with or the Electron will be confused. Try leaving it out and see what happens!

Line 50 is part of a set along with line 90. What happens is that the REPEAT keyword tells the Electron to do the following lines over and over again until a certain condition is met.

The lines to be repeated are those between the REPEAT keyword in line 50 and the UNTIL keyword in line 90.

This means that lines 60, 70 and 80 will be repeated over and over until the condition is met. It's what's known as a REPEAT. . .UNTIL loop.

But what of the condition? Well it's found in line 90, just after UNTIL. It tells the micro to carry on performing the lines marked out by the REPEAT and UNTIL keywords over and over again, only stopping the loop when **number** is equal to zero.

Let's take a look at what's happening inside this loop by inspecting lines 60, 70 and 80.

Line 60 consists of the keyword PRINT and this just prints a blank line on the display. The reason for having this line is that it makes the display look tidier. Leave it out and see what happens.

Line 70 is the line which asks you for a number. You must type in the number you want and press the Return key.

This number is given the stunningly original name of **number!**

Once it has a number, the Electron moves on to line 80 where the work of the program is actually carried out.

Here the figure you just entered is added to the total so far, which is called (can you guess?) **total.**

Of course, the first time round the loop **total** is zero (line 40 did that). However, as the program zooms around the loop, time after time, **total,** keeps a running total of the numbers typed in.

When you've entered all the figures you want added together, just type in 0 and press Return. This will make the variable number equal to 0. The value of **total** is unchanged by adding 0 to it. The important thing is that as **number** is zero, the condition of line 90 is fulfilled and the looping stops.

The Electron then goes on to the next line, which is line 100 and CLS tells it to clear the screen again.

Line 110 tells the micro to print out the answer to the sum.

It's a very simple little program but it does illustrate a few points. First of all it shows the use of a REPEAT. . .UNTIL loop with a condition attached.

It also shows that we can use one of the numbers we type in to fulfil this condition – and so exit from the loop when we want to stop counting.

The reason **number** equal to zero was picked as the finishing condition was that it wouldn't affect **total.** We wouldn't normally bother using a micro to add nothing to another number. We can do that in our heads!

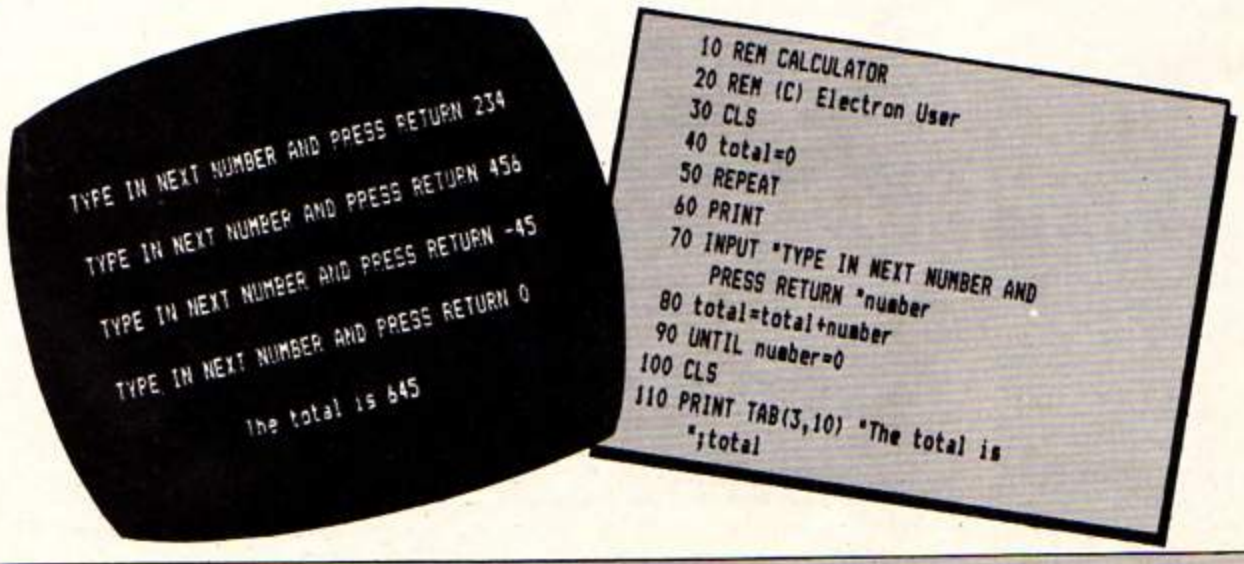
Try using another number as the exit condition and see what problems it might cause.

In fact when you've typed it in there's a lot more you can do with the program.

Try changing the plus sign to a minus sign in line 80. What about multiplication or division? Experiment and see.

As I said at the beginning, Calculator is a simple program, but with the power of your Electron simple things can go a long way!

Nigel Peters



Listings loopholes

ONE of the good things about *Electron User* is that it's full of listings of programs. Long ones, short ones, simple ones and hard ones, they're all there waiting for you to type them into your Electron.

This, however, is sometimes easier said than done! Typing in listings can be really frustrating if you're not careful.

I'm sure that we've all had the experience at one time or another of typing something in and it not working. Yet we can't find the fault no matter how hard we try.

Eventually we give up in disgust and say that the listing is wrong.

To be fair this can be the case, though it very rarely is.

Occasionally a part of a listing won't print out properly or a space will appear where there wasn't one in the first place.

However this doesn't often happen, and the sad fact is that if the program won't work you've almost certainly made an error typing the listing into your Electron.

I speak from experience because at one time or another I've made every error that's possible (and some I'm sure that aren't).

Even now, when I should know better, I still end up looking at a listing convinced I've not made a mistake but knowing in my heart of hearts that I probably have.

So from my vast experience of making mistakes I'll give you a few hints on how to stop those errors creeping in.

The first thing is *don't get carried away*. It's all too easy to become obsessed with a listing that's gone wrong, struggling with it for hour after hour, eventually losing your temper.

If you don't spot the mistake in the first quarter of an hour then give up for a little while. Go and have a cup of coffee or something.

It's suprising how often you see the mistake as soon as you try again after a rest.

One of the daftest mistakes you can make is to leave out a complete line of a listing. Of course the program won't work properly if it isn't all there, but lots of times we expect it to.

NIGEL PETERS is living proof of that old saying: "You learn by your mistakes"! In this article he describes some of those mistakes and gives advice on how you can avoid them.

The trouble is that the Electron can't tell you "line 450 is missing" because it doesn't know that there should be one.

So any error message it comes up with isn't all that helpful, often pointing to some other part of the program that depended on the missing line.

Suppose line 450 was something like

cowboys=8

that is, it gives the variable **cowboys** a value of eight.

Now if you leave this out the Electron will either use an earlier value of **cowboys,** which might be completely wrong, or tell you that there is "no such variable" if you try to use it later in the listing. It won't tell you where the missing line should be.

The moral is that if you're typing in a listing then type in all of it.

And when you're doing this, pay close attention to the letters used in the listing.

The Electron can tell the difference between capital letters and small letters. This means that if the listing contains **indians** in small letters and you type it in as **INDIANS** you'll get an error message.

You know what you mean but the micro doesn't. It's expecting **indians,** not **INDIANS.** Program I shows this happening.

```
10 REM PROGRAM I
20 LET indians = 5
30 PRINT "There are "
  ;INDIANS;" indians"
```

Also you have to get the spelling exactly right. The Electron can only understand a few words, the Basic keywords like PRINT, LIST and LET.

Misspell these and you're in trouble, as Program II shows you. Happily the micro does tell you if you've done this so it's easy to track down.

```
10 REM PROGRAM II
20 LET indians = 5
30 PRNT "There are
";indians;"   indians"
```

Spelling really is important. If the program contains PROC-crash and you type in PRO-Crash it won't work. I know, I've done it. Often.

So if you want a listing to work, you have to type it in correctly. Easier said than done as it's amazing how your mind can wander when you're doing it.

Nowadays I try to enter a long listing in three or four sessions rather than just one, SAVEing it to tape in between times.

Incidentally I recommend that you SAVE your program every 20 or thirty lines. This is in case you lose your listings by accident, such as a power cut or a meddlesome younger brother.

You might lose all your work from the Electron's memory but you will have the best part of it on tape.

There are some classic errors that I'm sure everyone has made at one time or another. These are based on the similarity between certain letters and numbers.

Probably the most common, and the hardest to detect, is confusion between the numeral "0" and the letter "O".

On poor quality listings these look very much the same, and even with clear listings it's easy to press one key in mistake for the other.

The Electron, however, won't like it and the program will almost certainly grind to a halt. Try out Program III and see what happens.

```
10 REM PROGRAM III
20 FOR loop= 0 TO 2
30 PRINT "You've mixed up
0 and O"
40 NEXT loop
```

The same kind of confusion can arise between the letter "l" and the number "1". They look fairly similar but the Electron won't like it if they're confused. Also capital "I" sometimes gets caught up in the mistaken identity act.

These errors are easy to make, but once you're aware of them they're also easy to avoid. Having said that I still regularly mix up the small "x" and capital "X", to the annoyance of my Electron.

Another pair of lookalikes to be wary of are the minus sign "-" and the underline sign "_" which are often confused.

You'll find the minus sign in subtractions and the underline sign in the middle of variable names. Don't mix them up.

Let's move on from problems caused by similarities between letters and numbers to problems caused by getting the punctuation wrong. In particular it's all too easy to confuse the fullstop ".", the semicolon ";" and the comma

";". The trouble is these can look very similar on listings and mistakes are easily made.

This can cause all sorts of problems, ranging from having displays in the wrong place and producing error messages from the micro, right the way through to blank screens and hung programs.

Try messing about with the punctuation of a VDU statement and you'll see what I mean. It's very easily done and the results can be offputting to say the least.

Also, mixing up a comma with a fullstop can lead to problems in data lists where items are separated by a comma. For example, what should be:

```
DATA 3,3.5,4,4.5
```

could be typed in as:

```
DATA 3.3.5.4.4.5
```

The decimal point in 3.5 has become a comma. This will result in the wrong data being read and the program will run incorrectly, if at all.

What's particularly annoying is that the Electron won't tell you that there is now one too many items on the data list. It only displays an error message when there are too few items. This can be tricky to sort out.

The moral is to be very careful with punctuation marks in listings. They may not mean a lot to you but they do to the Electron.

Get one wrong and it can be difficult to find and remedy.

You'd think that the above was enough but, no, there are more simple but common mistakes waiting to be made.

One of the easiest to make and the most difficult to spot is to put in a space where it shouldn't be.

No doubt you've been told that the Electron will ignore spaces and just get on with reading the Basic keywords and variables.

Well this is true, except where it isn't! In some cases having a space can be a disaster.

Try Program IV and see what happens.

```
10 REM PROGRAM IV
20 FOR loop= 0 TO 2
30 PRINT TAB (5,5)
"You've left a gap."
40 NEXT loop
```

The problem is that there is a space directly following the TAB statement. The Electron is expecting a bracket and so you get an error message.

It's the same with the random number generator. RND(100) is correct whereas RND (100), which has a space after the RND, is wrong.

Also notice that it is:

```
X + 0.5
```

and not:

```
X + 0 .5.
```

These can be quite hard to sort out. I try never to leave a space between any keyword and the numbers in brackets that may follow it.

The next type of error is almost exactly the opposite. Here you need a space but you haven't left one.

As you might know, Electron Basic allows its Basic keywords to be "embedded" in variable names.

That is, you can have names like **GOODRUN** and **SHOPLIST** which contain the keywords RUN and LIST.

The Electron will accept these but it won't accept variable names that actually begin with a keyword. This means that names such as **RUNNER** and **TOMATO** aren't allowed as they start with the Basic keywords RUN and TO.

I try to avoid using variable names that contain keywords as it makes life a lot easier.

Now the problem is that the Electron is quite willing to accept that a keyword can be the end part of a variable name. So if you follow a variable name with a keyword and don't leave a space then they're joined together as one word.

Suppose you had a line like:

```
IF INCOME < EXPENDITURE THEN
PRINT "BROKE"
```

If you left out the space between **EXPENDITURE** and **THEN** you get one long word:

EXPENDITURETHEN

The Electron thinks this is just a variable name and looks for it. When it doesn't find it the program will crash. Program V illustrates this.

```
10 REM PROGRAM V
20 LET indians=8
30 LET cowboys=4
40 IF cowboys<indiansTHEN
PRINT "You've not left
a gap."
```

With all these possible mistakes it's a wonder that any listings ever do get typed in correctly.

And there are two more simple errors that can be made as well.

The first is to use the AUTO command to make the micro print out the keywords, then forget you're using it and type in the line number again.

A line number like 20 20 is a dead giveaway that you've made this mistake.

I've done it so often that I now never use AUTO.

Incidentally you'll find that if you make this mistake 20 20 is treated as line 20. Program VI illustrates this.

```
10REM PROGRAM VI
20 20LET indians=8
30PRINT "You've forgot
about AUTO."
```

The final error is really stupid but, sadly, all too easy to make. It's done by forgetting that you've already got a program in the Electron's memory.

You then type in your listing and if the line numbers of the two programs aren't exactly the same they get mixed up.

The last line of Program VII is obviously left over from an earlier program and shouldn't be there at all.

```
10 REM PROGRAM VII
20 LET indians=8
30 LET cowboys=4
40 IF door$=open$
THEN PRINT "Enter
at your peril"
```

And that brings us to the end of our survey of the mistakes that can be made when typing in listings.

Don't worry, you won't make all of them in the same program, though I'm sure everyone will make them at one time or another.

Now that you know what they are they should be easier to find and correct.

One point to bear in mind is that when you find a mistake in a line don't think that it's the only one.

If you made an error then your concentration was lacking at that point and there may be another one lurking on the same line or thereabouts. It's amazing how often they come in pairs.

Anyway, here's your chance to practice. I think Program VIII contains an error or two. Can you sort it out?

```
10 10REM PROGRAM VIII
15 LeT
total=0;subtraction=3
20 FOR X=1 TO 5
30 REED Number
40 total=totaI + nuaber
50 NEXT x
60 PINT TAB (5,5) TOTAL
70 Print
TOTAL_substraction
80 DATA 1,2,3.4,5
```

Notebook

I'm seeing stars...

STARS is a program that uses your Electron to produce an endless stream of stars of varying colour on the TV screen. It's not only the stars that change colour, the background does as well.

The program, which consists of only 11 short lines, shows how easily and simply quite impressive displays can be produced by your Electron.

Type it in and try it out. If you want to see some twinkling stars, change the figure 8 in line 60 to the number 16.

Now can you understand what your Electron is doing?

LINES 10,20 REM statement

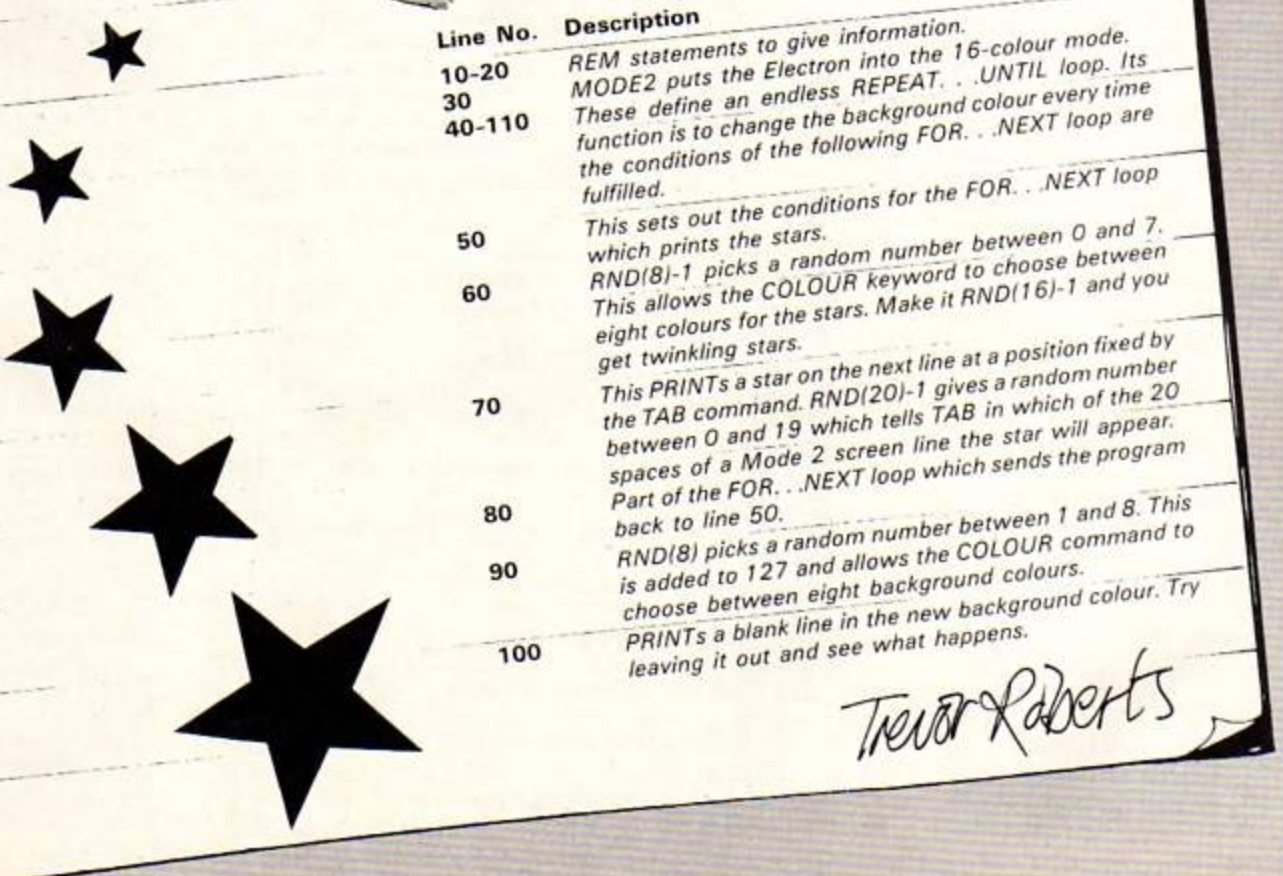
LINES 40 to 110 REPEAT...UNTIL loop

LINES 50 to 80 for...NEXT loop

```
10 REM COLOURED STARS
20 REM (c) Electron User
30 MODE 2
40 REPEAT
50 FOR line= 1 TO 120

60 COLOUR RND(8)-1
70 PRINT TAB(RND(20)-1)
   "*"
80 NEXT line
90 COLOUR 127+RND(8)

100 PRINT
110 UNTIL FALSE
```



Line No.	Description
10-20	REM statements to give information.
30	MODE2 puts the Electron into the 16-colour mode.
40-110	These define an endless REPEAT. . .UNTIL loop. Its function is to change the background colour every time the conditions of the following FOR. . .NEXT loop are fulfilled.
50	This sets out the conditions for the FOR. . .NEXT loop which prints the stars.
60	RND(8)-1 picks a random number between 0 and 7. This allows the COLOUR keyword to choose between eight colours for the stars. Make it RND(16)-1 and you get twinkling stars.
70	This PRINTs a star on the next line at a position fixed by the TAB command. RND(20)-1 gives a random number between 0 and 19 which tells TAB in which of the 20 spaces of a Mode 2 screen line the star will appear. Part of the FOR. . .NEXT loop which sends the program back to line 50.
80	RND(8) picks a random number between 1 and 8. This is added to 127 and allows the COLOUR command to choose between eight background colours.
90	PRINTs a blank line in the new background colour. Try leaving it out and see what happens.
100	

Trevor Roberts

Solve this ancient puzzle

DENIS SMITH has taken an old oriental puzzle and brought it up to date – but it's just as difficult to solve!

TOWERS of Hanoi is the Electron version of an age-old puzzle that has confounded generations.

It consists of three posts, the first of which carries a number of rings, each of a different size.

The idea is that you have to move the rings from the post on the left to the middle post.

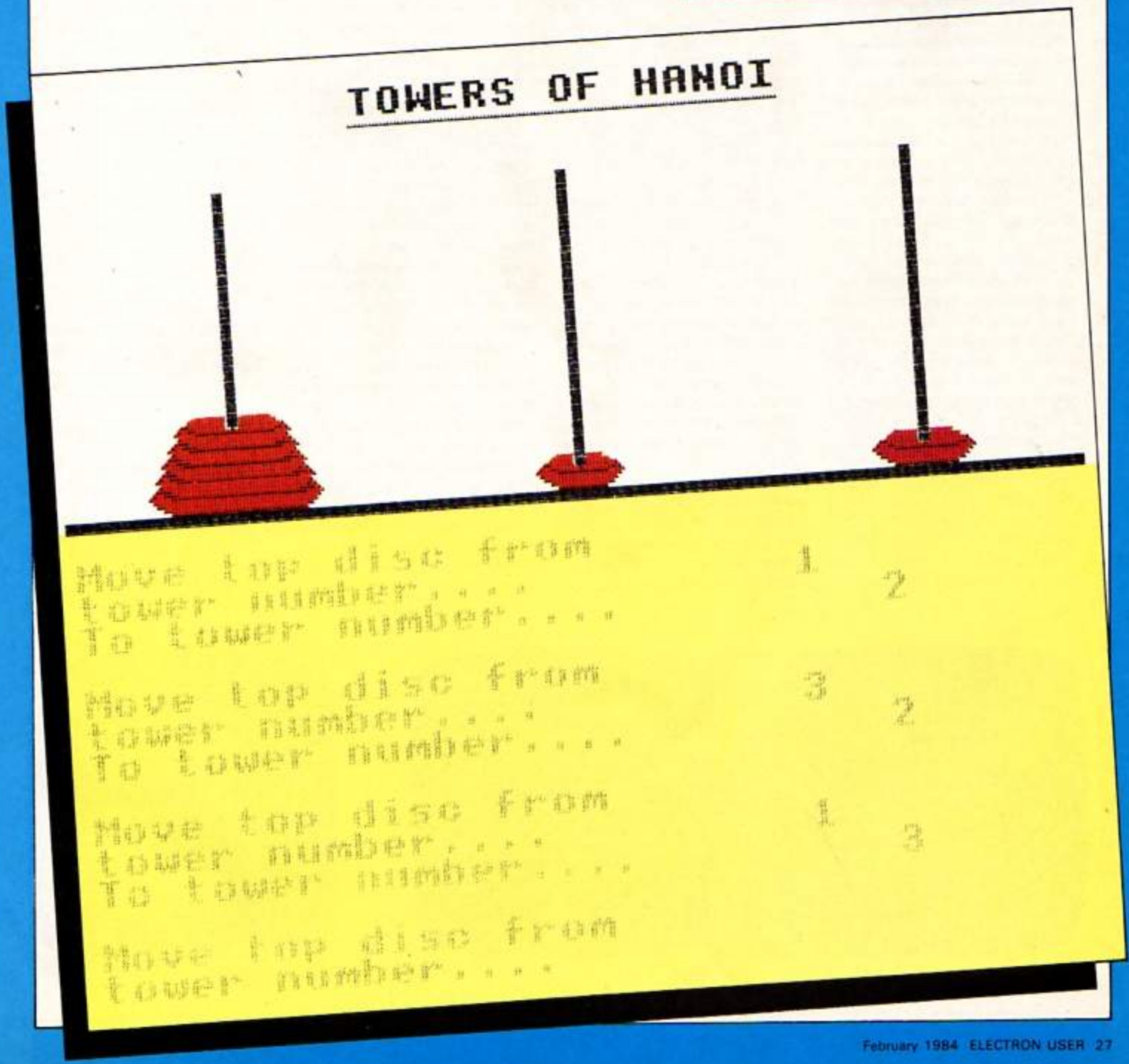
When you move a ring it has to be slipped onto one of the other two posts, but that's not as easy as it may seem.

The rules state that you cannot put a larger ring on top of a smaller one, so you have to do some careful manoeuvring.

Towers of Hanoi is simple to play but hard to solve. It's fascinating, frustrating and compulsive.

And don't worry if you have problems, the Electron will show you how to do it if you ask!

Full listing starts on Page 56



Electron à la Mode

MIKE MacMANUS makes your micro's modes more meaningful

WHEN a micro is designed its creators always have one major problem. This is how much of its memory to use for nice graphics effects – which means lots of colours – and how much to leave for the actual programs that will need these effects.

It's always a matter of compromise. If you want a lot of colourful material on the screen then you don't have much left for the program itself.

If you have a very big program then there won't be much memory available to use for the graphics display.

What usually happens is that a compromise is made and the poor programmer is stuck with what he's given.

Happily the Electron isn't like this. It offers you a choice of compromises in the form of the mode you use for your programs.

There are seven modes, numbered from 0 to 6. Each uses a different amount of memory and each produces a slightly different type of display.

Let's go through each mode one by one and start by typing in and running Program I:

```
10 REM PROGRAM I
20 MODE 0
30 FOR COL=0 TO 31
40 FOR ROW=0 TO 79
50 PRINT TAB(ROW,COL)"*";
60 NEXT ROW
70 NEXT COL
```

What this does is to use line 20 to put the Electron into Mode 0 and then fills the screen with asterisks, using two FOR . . . NEXT loops.

As Mode 0 has a screen which contains 32 rows of 80 characters each, then 32 × 80 asterisks are produced.

Instead of the asterisk in line 50 you could have used a letter or any other character of the keyboard and these would be printed out. Try it and see.

After a program has printed out 32 lines the screen scrolls upwards one line to allow room for the next bit of output. This explains why, if you count, you'll see that there are only 31 lines.

The program did print 32 of them – honest! – but when the last asterisk was printed on the bottom line it moved everything up one line to make space for what comes next.

You'll see the prompt there, waiting for something to do.

If you look hard enough at the program running you'll see that the last line is actually printed out and then everything scrolls upwards.

Try typing in a few letters and you'll see how they look on the screen. They are quite finely drawn, aren't they?

In fact, if you are using a domestic TV, you may find that it appears a bit of a mess as it doesn't have the necessary resolution to show all the letters properly.

A monitor would show it to its full effect as it has a higher definition.

Figure I shows the layout of a Mode 0 screen. Notice that the character spaces across are numbered from 0 to 79 – which makes 80 characters in all.

The rows are numbered 0 to 31 from top to bottom – so there are 32 rows in all.

This may seem a daft way of doing it but it will come in useful later when we cover the TAB command.

So Mode 0 can have text of 80 characters across, 32 rows of them on a screen.

To do this it uses up a massive 20k of your memory. Since you only have 32k to begin with you are only left with 12k for the actual program.

The screen has stolen most of the memory.

This is shown in Table I which also tells you that it is a two colour mode. This means that you can only have two colours on the screen at the same time.

When you switch on these are usually black and white, but you can alter this by adding:

```
23 VDU 19,0,3,0,0,0
24 VDU 19,1,4,0,0,0
```

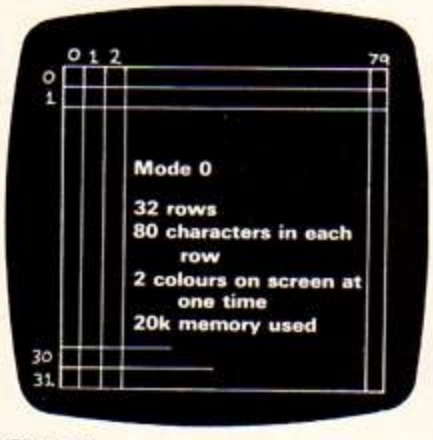


Figure I

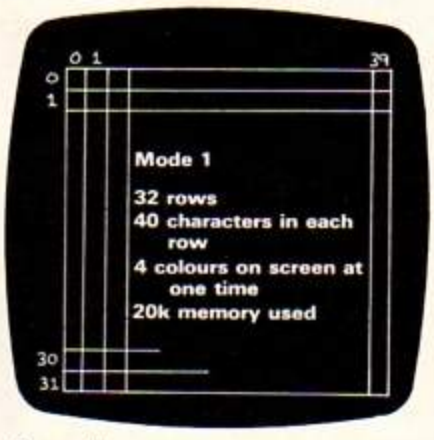


Figure II

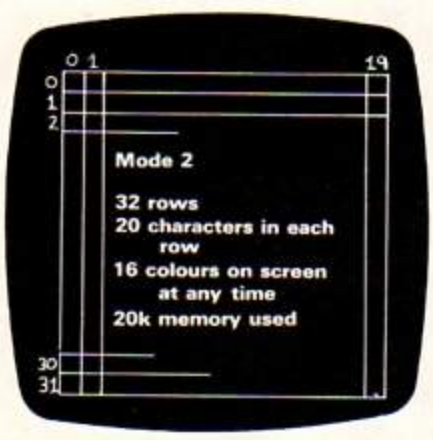


Figure III

which produces blue characters on a yellow background.

In fact you can have any of 16 colours available on the Electron, but you can only have two of them at any one time. This is why it is called a two colour mode.

Let's move on to Mode 1 by running Program II:

```
10 REM PROGRAM II
20 MODE 1
30 FOR COL=0 TO 31
40 FOR ROW=0 TO 39
50 PRINT TAB(ROW,COL)"*";
60 NEXT ROW
70 NEXT COL
```

This is practically the same as Program I except for the fact that Mode 1 has only half the number of characters in a row so the loops are different.

There are still 32 rows but only 40 characters in each. Count the number of asterisks and you'll see this (but remember that the bottom line has scrolled up).

Figure II shows the screen layout.

Logically you might think that this will only take up half as much memory as Mode 0 as there are only half the number of characters in a row.

However Mode 1 is a four colour mode – you can have four colours on the screen at one time – so more memory is used to produce the extra colours.

The total memory used is still 20k, again leaving you with 12k.

So if you want lots of characters in a line with only two colours, you use Mode 0. If you want fewer characters on the screen but four colours, then use Mode 1.

If you want to see two of the available colours then add the following lines:

```
25 VDU 19,0,1,0,0,0
26 VDU 19,3,2,0,0,0
```

We'll be covering how to get the other colours in later articles. At the moment we'll just explore the modes using keyboard characters, avoiding more specialised graphics for the moment.

Try typing in a few letters and notice how they are rather bigger and squarer than in Mode 0.

This is because they have twice as much room as in Mode 0. Remember there are only 40 characters in a line as opposed to 80.

Moving quickly onto Mode 2, run Program III and see what happens to our screenful of asterisks:

```
10 REM PROGRAM III
20 MODE 2
30 FOR COL=0 TO 31
40 FOR ROW=0 TO 19
50 PRINT TAB(ROW,COL)"*";
60 NEXT ROW
70 NEXT COL
```

As you can see they become quite chunky as there are only 20 to a line. However, you still use the same amount of memory as in the other modes, because you now have the choice of having 16 colours on screen at the same time.

As you might expect, this uses up any memory that you might have saved by having fewer characters on a line. Figure III shows the screen layout.

Try typing in a few letters and see how chunky they are.

As you might guess we move on to Mode 3 with Program IV:

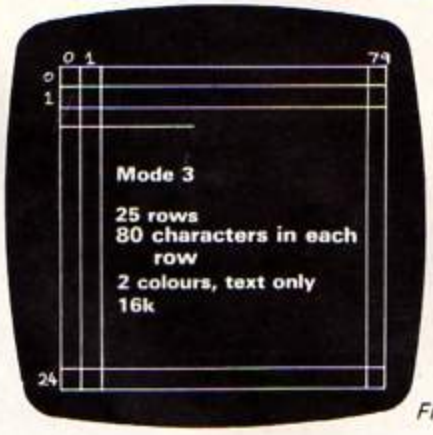


Figure IV

```
10 REM PROGRAM IV
20 MODE 3
30 FOR COL=0 TO 24
40 FOR ROW=0 TO 79
50 PRINT TAB(ROW,COL)"*";
60 NEXT ROW
70 NEXT COL
```

Now we're back to 80 characters in a row but there are only 25 lines.

This is much the same as Mode 0 except that there are seven fewer rows and it's a text only mode. You can't use any of the Electron's special graphics abilities.

What makes up for this is that it only uses 16k of memory, which is less than any of the modes we've come across so far. Figure IV shows the screen layout.

You might have noticed that the lines in Mode 3 are separated by a slight space. If you change the colours by running the program again with lines:

```
25 VDU 19,0,2,0,0,0
26 VDU 19,1,1,0,0,0
```

you'll see this more clearly.

Running Program V will show us yet another screenful of asterisks, each asterisk using one character position:

```
10 REM PROGRAM V
20 MODE 4
30 FOR COL=0 TO 31
40 FOR ROW=0 TO 39
50 PRINT TAB(ROW,COL)"*";
60 NEXT ROW
70 NEXT COL
```

This is another screen which has 32 rows, each having 40 characters. This is the same sort of layout as Mode 1 but only has two colours available.

Hence it only takes up half the memory – 10k – leaving more for the program. Figure V sums it up.

Program VI takes the Electron into Mode 5, which has the same screen layout as Mode 2 but only uses half the memory as there are only four colours allowed on screen at one time:

```
10 REM PROGRAM VI
20 MODE 5
30 FOR COL=0 TO 31
40 FOR ROW=0 TO 19
50 PRINT TAB(ROW,COL)"*";
60 NEXT ROW
70 NEXT COL
```

You'll probably recognise

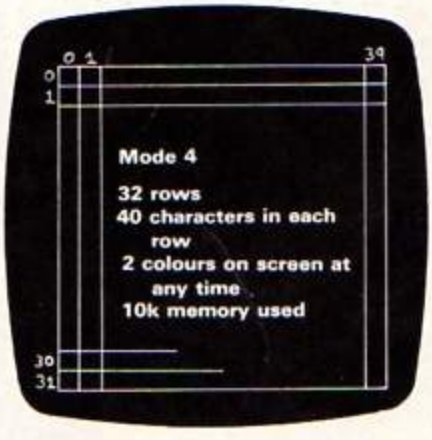


Figure V

MODE	No. of colours	Text		Memory used
		char.	lines	
0	2	80	32	20k
1	4	40	32	20k
2	16	20	32	20k
3 †	2	80	25	16k
4	2	40	32	10k
5	4	20	32	10k
6†	2	40	25	8k

† text only

Table I

From Page 29

the chunky characters again. Figure VI shows how the screen works.

Finally we come to Mode 6 which you probably already know as it's the mode that your Electron is in when it switches on.

It's another text only mode. In other words, you can't get the special graphics effects we'll be covering in later articles. Run program VII:

```
10 REM PROGRAM VII
20 MODE 6
30 FOR COL=0 TO 24
40 FOR ROW=0 TO 39
50 PRINT TAB(ROW,COL)"*";
60 NEXT ROW
70 NEXT COL
```

This is the last screenful of asterisks in this article, I promise!

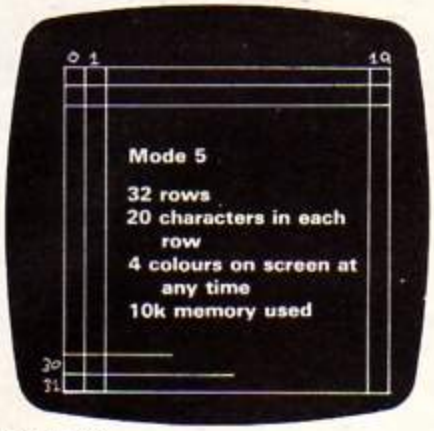


Figure VI

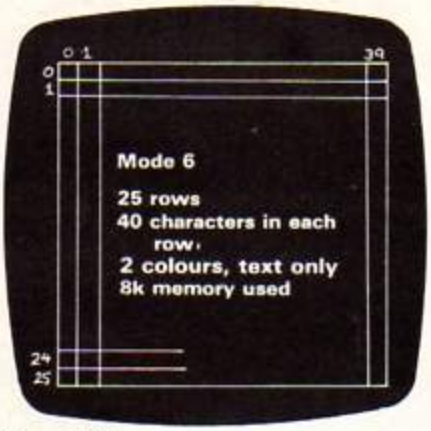


Figure VII

It has 25 rows, each of 40 characters and takes up only 8k of memory. This is less than any of the other modes.

It gives nice, clear listings and is the one I use to type in programs. Figure VII shows the screen layout in all its glory.

And those are all the modes available on the Electron. However there's a lot more to each than we've touched on in this article.

We've just used text characters, ignoring the Electron's specialised graphics.

Which particular mode you choose for a program depends very much on what you want to do.

If you're just producing a screenful of text, you can use Mode 0 or Mode 6. If you want lots of colours you'll have to use Mode 2.

Experience will help you to tell which mode meets your needs.

Anyway that's all for now. Try working your way through the modes, seeing how each screen changes, especially the shape of letters.

Just a little practice will soon make you confident and able to choose the best mode for your programs.

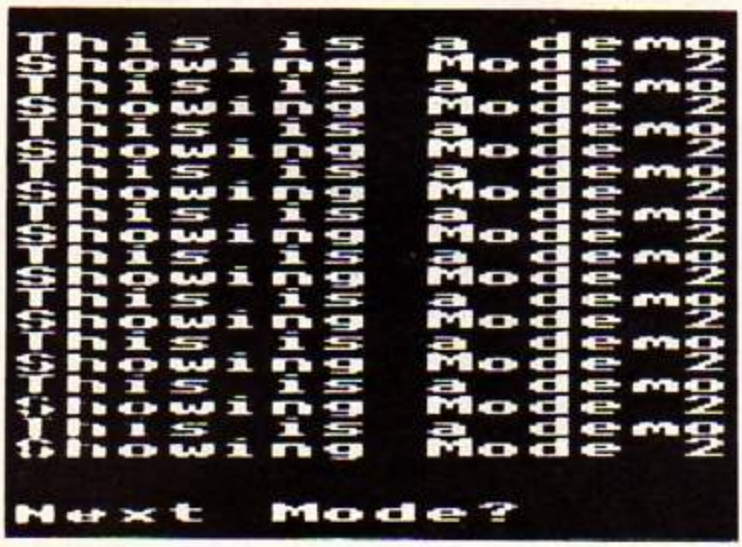
Mike MacManus

And now for the real thing!

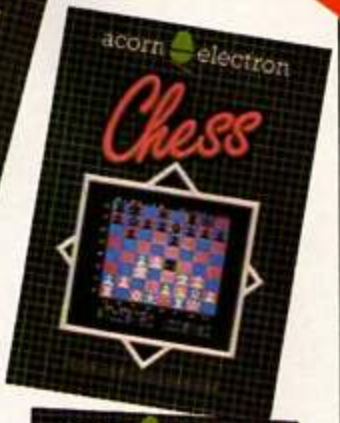
NOW that you know all about how the different screens are made up why not run this program and see how the different modes treat the letter characters?

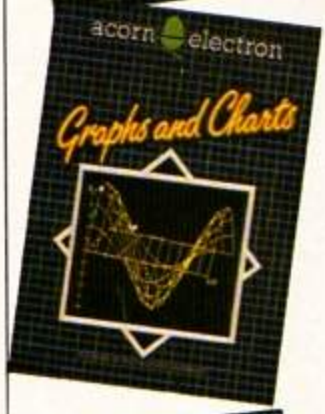
Run the program and the Electron will ask you ''Next Mode?''. Put in the number of the mode you want to see and the micro will give you a demonstration.

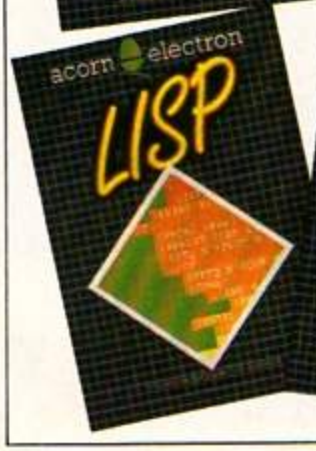
```
10 REM *MODES EXAMPLE*
20 REM RIPPED OFF FROM
30 REM **MIKE BIBBY**
40 REPEAT
50 PRINT ''"Next Mode?";
55 PRINT
60 mode%=GET
70 IF (mode%-48)>6 OR (mode%-48)<0
     THEN PRINT ' "There are only
     seven modes!"
     :GOTO 50
80 MODE mode%
90 FOR loop%=1 TO 20 STEP 2
100 PRINT "This is a demo"
110 PRINT "Showing Mode ";CHR$ (mode%)
120 NEXT loop%
130 UNTIL FALSE
```



FREE CONTEST







WIN a year's supply of software

SO you've got yourself an Electron! Congratulations on your wise choice. No doubt now you'll want some software to run on it.

Well here's your chance to get a complete set of Acornsoft cassettes for free in our first *Electron User* competition – one for each month of the year.

As you know the Electron has the following outstanding features, which help to make it one of the best micros available:

A. BBC Basic	**F.** User defined keys
B. Single key entry	**G.** User defined characters
C. Choice of several modes	**H.** Well documented manual
D. Attractive design	**I.** Powerful operating system
E. Built-in assembler	**J.** Keyboard with real keys.

We want you to put these into a list in descending order of importance. Then just complete the sentence in no more than 25 words and send it to us on the coupon below.

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The closing date is February 28, 1984 and the judge's decision is final.

ELECTRON USER CONTEST

1. 6.
2. 7.
3. 8.
4. 9.
5. 10.

I'm glad I got my Electron because . . .
(not more than 25 words)

_____

_____

_____

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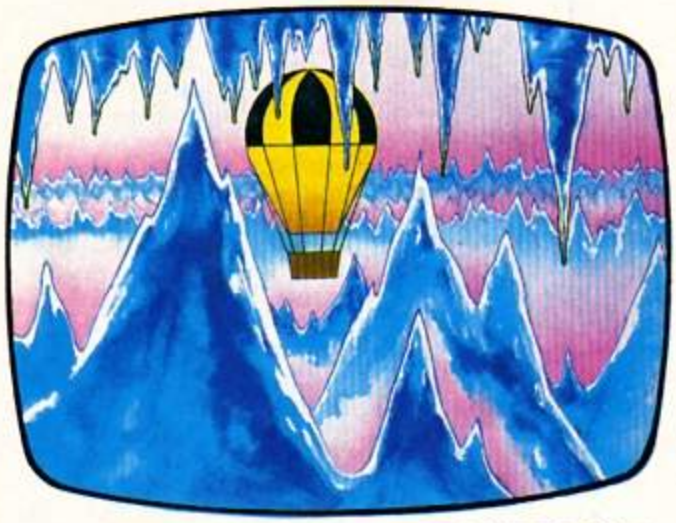

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BARCLAYCARD VISA

TREVOR ROBERTS looks at the Electron's keyboard and explains what each key does

Here's the key to the Electron keyboard

ONE of the nice things about the Electron is that it has a real keyboard, not just one of those horrible squelchy rubber pad jobs.

When you consider that all your communication with the micro has to go through the keyboard, you'll see that this is a big plus in the Electron's favour.

At first sight the keyboard looks like the one you'd find on a normal typewriter, and this is what it is.

However, since a micro is much more complicated than a typewriter, you won't be surprised to learn that the Electron's keyboard has a few additional features.

Don't worry though, it's quite easy to use and after a little practice it all becomes second nature.

In fact it's just like everything else about the Electron!

Let's just look at the top of all the keys, ignoring for the present the brown letters on the front of some of them.

You'll see that most of them just have a single black letter on top as in Figure 1. You'll guess, quite rightly, that when you press these a letter will appear on the television screen. (That's assuming that you've connected it all properly.)

Don't just take my word for it. Press a few of the letter keys and see what happens.

Now these letter keys can produce two kinds of letters, capital letters like A or B and small, lower-case letters such as a or b.

Whether you get capital or small letters depends on the use of the key with SHIFT written on it. There are two of these, one at either end of the bottom row of keys. They both do the same job, there being two of them for convenience.

When you first power up your Electron (that is, you plug it in) you'll see that a little yellow light by the side of the keyboard is shining. This shows that the Electron keyboard is in a state known as "CAPS LOCK".

Figure I: Letter key

If you press the letter keys now you'll find that they all produce big letters.

So with the little yellow light shining the letter keys produce capital letters. Now suppose you want small letters, can you get them while the little light is shining?

The answer is yes. What you do is to press the letter key and one of the SHIFT keys at the same time. This will produce a small letter.

The rule is that the CAPS LOCK on the Electron produces capital letters when a letter key is pressed. Small letters are produced when a letter key is pressed at the same time as the SHIFT key.

Go on, try it out and you'll soon get the idea.

You'll notice that I've only covered the case when the little yellow light to the top left of the keyboard is on. What if it isn't shining? In fact how do you stop it shining.

Well, to switch off the light you make use of the key with CAPS LK and FUNC written on it. You'll find this at the left of the keyboard just by the light.

If you press this key and the SHIFT key at the same time you'll notice that the light goes off. If you then repeat this, pressing the keys again, you'll see the light comes on.

Using CAPS LK and SHIFT together switches the light on and off.

Now let's switch the yellow light off and see what effect this has on the letter keys.

Press a few of them and you should see that you get small letters. If you don't, then make sure that you've switched off the yellow light!

So you get small letters from the letter keys when the light is switched off. Now try pressing SHIFT at the same time as you press a letter key. You'll find that you get capital letters.

In other words, when the yellow light is off the letter keys work in a reversed fashion, completely opposite to the way they do when the light is on.

When the light is on the keyboard is said to be in CAPS LOCK and will produce capital letters unless the SHIFT key is pressed.

When the light is off the letter keys produce small letters. If you want capitals when the light is off you must

press SHIFT at the same time.

It's up to you whether you prefer to have the light on or not. Beginners might find it easier to have it on and work in capital letters most of the time.

However, as they get more experienced programmers tend to use the small letters a lot more, so they would prefer to have the light off and just press SHIFT when they want capitals.

Now let's leave the letters and try using the numbers keys, which you'll find on the top row of the keyboard.

These have two black characters on them like Figure II. The top one is a symbol such as $ or ! while the bottom characters have a number such as 2 or 8.

You'll notice that if you press one of these keys by itself the number on it appears on the screen.

If you press one of the keys and SHIFT at the same time you'll see that it is the symbol that appears. Again try it for yourself and see.

This works whether the yellow light is shining or not. In other words, the top row of keys is independent of whether the letter keys are in CAPS LOCK or not.

The more observant of you will have noticed that I've been ignoring the keys that have three black symbols on them.

Figure II: Number key

You'll find them at the top right of the keyboard. Figure III gives an example of one of them.

These keys aren't really all that different from the others.

You get the bottom symbol of each of the five keys by just pressing that key by itself. For the top left symbol you press the key and SHIFT at the same time. Thus pressing the key with the £ sign and SHIFT at the same time will produce the £ sign.

To get the third black symbol on these keys you just press that key along with the key marked CTRL, which is at the left of the keyboard.

This means that if we want the bracket sign that you'll see next to the £ sign you press that key and the CTRL key at the same time.

It's easy enough, but you may wonder what exactly the four arrows and COPY do, as they don't cause anything to appear on the screen.

This is because these five are the editing keys. They are there to help you tidy up and duplicate the screen display.

They control the movement of the flashing cursor and allow you to copy and amend the text on the screen.

They come into their own when you're writing programs, and we'll be covering them in a future article.

The CTRL key does have other uses besides selecting the third black symbol. Try pressing it along with L and you'll see that whatever is on the screen magically disappears.

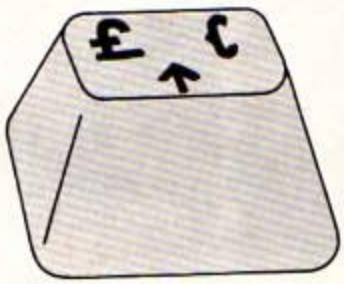

Figure III: Arrow key

Also try pressing CTRL and G at the same time. As you can see, there's more to CTRL than meets the eye!

So far we've covered nearly all the keys of the keyboard (ignoring the brown words and symbols).

Have you noticed that you can get any of the symbols using a letter or a number key and just one of the two keys CTRL and SHIFT?

These are called the control keys (using them gives you control of the keyboard).

There is one other control key, and that is the one marked FUNC. We've met it before as it also has CAPS LK written on it.

This FUNC key is very useful, as it saves a lot of time when typing in programs. It controls the use of the brown letters on the front of most of the keys.

You'll have seen the brown words on the front of the letter keys, as in Figure I.

If you press one of these keys and FUNC at the same time you'll see the brown word appear on the screen.

Try pressing L and FUNC at the same time and the word LIST appears on screen.

This is a very useful feature, as when you're typing in long programs you may have to enter the same word over and over again.

As you can see, it's much easier to press Y and FUNC to get REPEAT than to type it in letter by letter.

These brown words on the front of the keys are special words in the sense that the Electron's computer language, Basic, understands and obeys them.

As you get more experienced and your knowledge of Basic grows you'll find this quick way of entering these Basic keywords really saves time.

You might have noticed that the keywords on the R and O keys have a funny bent arrow symbol after them.

This means that as soon as you press FUNC and that key the keyword will be obeyed immediately by the computer. This will make more sense when you start running programs.

What about the brown symbols on the number keys like Figure II?

Well, you use these just like the other keys. The difference is that you can control what happens and don't just have to accept what the Electron keyboard gives you.

If you press U and FUNC at the same time the word UNTIL appears on the screen. That is the way that the micro works, and it's fixed.

However, the 10 brown keys at the top of the micro can be programmed to produce what you want them to. This can be extremely helpful, and we'll be covering it in detail in *Electron User*.

At the moment, since we haven't programmed it for anything, pressing FUNC and 1 will do nothing.

Now try this. Switch the Electron off, then switch it on again. (This is a rather drastic way of getting rid of everything you've entered into the Electron.)

Now type in:

***KEY 1 HELLO**

and look for the key with RETURN written on it. Press this.

Now when you press FUNC and 1 at the same time the Electron will say hello to you. This is fairly trivial, but don't worry, there are much more serious uses.

We're now approaching the end of our tour of the keyboard and we'll deal with the keys marked DELETE, SHIFT and RETURN.

As you might expect, the DELETE key, found at the bottom right of the keyboard, is used to delete or erase things from the screen.

If you press it once it will move the cursor one space backwards, rubbing out what-

→

From Page 35

ever was there.

If you keep your finger on it you'll see the cursor speed up and shoot across the screen rubbing out everything in its path.

This is known as the auto-repeat facility, and most of the keys have it, as you have no doubt found out for yourself.

It can be a bit of a mixed blessing. Again, you've probably found this out already!

The ESCAPE key, found at the top left of the keyboard, is the panic button. If a program isn't doing what you want or won't finish then pressing ESCAPE will interrupt it.

It leaves the program intact, however, so you can figure out what went wrong.

The BREAK key is somewhat similar but stronger. This will work for things that ESCAPE can't cope with, but you stand to lose your program or at least some of its component variables. Pressing FUNC and 0 will remedy this.

If all else fails then press CTRL and BREAK. This really does wipe the computer's memory, and will stop practically anything.

Try them both and see if you can see any difference. If you can't, I'll give you a clue and tell you it might drive you nuts.

And that's the tour of the keyboard over. I've summed it up briefly in Table I. As you can see, it's not too complicated. It just needs a little practice.

And that's where you come in. Play around with your Electron. If you want to know what happens if you press something, then do it.

It's almost impossible to hurt your Electron by anything you put in at the keyboard. (I say almost, because, although I can't figure out how anyone could do it, I have great faith in human ingenuity.)

So it's over to you. Have fun with your Electron. Once you've mastered the keyboard you're a long way into mastering the micro.

Keys pressed	CAPS LOCK on	CAPS LOCK off
Letter key	Capital letters	Small letters
Letter key + SHIFT	Small letters	Capital letters
Number keys	Bottom number in black	
Number keys + SHIFT	Top black symbol (Top left if three symbols)	
FUNC + key	Basic keyword or defined function	
CTRL + key	Top right black symbol of three symbol keys	

Table I: How the three control keys work

Can YOU write games for the Electron?

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Will they or won't they? The answer is:

Yes, our programs also work on the BBC Micro

ONE of the most frequent questions we get at *Electron User* is whether or not the programs listed in this magazine will also work on the BBC Micro.

The brief answer is that they will all work without modification on a BBC Micro which has a 1.2 Operating System and Basic II.

To find out which Basic chip the BBC Micro contains just enter REPORT after you've switched on and if you get "Copyright 1982" you know that you've got Basic II.

If however, you've got Basic I you might find a few problems as some of the commands have been changed.

Happily, most of these are fairly obscure and we've not yet used them in *Electron User* programs.

We will, however, be covering them in later articles.

One problem that you might come across when trying to run *Electron User* programs on a 1.2 OS machine with Basic I is that you sometimes get syntax errors.

This is because Basic II allows semi-colons in certain places that Basic I does not.

Fortunately it's easy to remedy. Just run the program and the syntax error message will give you the line that the mistake is on. List this line and change the offending semi-colon to a comma.

If there is an ONERROR instruction in the programs, you might have to take this out to actually receive the error messages.

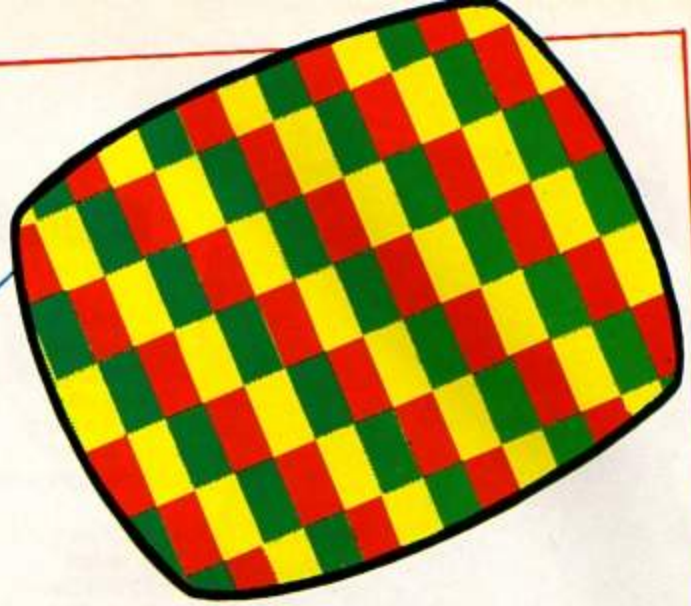
As for OS 1.0 and OS 0.1, nearly all of the *Electron User* programs will work without modification. The best advice is to see your dealer and get a 1.2 OS. It's much simplier to put a chip in than to try to get the problem programs to work!

Two further points for people running *Electron User* programs on the BBC Micro:

The first is that the BBC Micro is much faster than the Electron and some of the programs might be too fast. An article on how to slow down the BBC Micro appeared in the December, 1983, issue of *The Micro User.*

The second point is that people with disc systems might need to download some of the programs before they are run. Again, details of this can be found in the Micromail section of the July, 1983, issue of *The Micro User.*

Let your micro weave a Tapestry



Not quite the same as the famous Bayeux tapestry, but this simple program by PAUL JONES and PETE BIBBY creates fascinating and complex imagery

USE your Electron to produce multicoloured tapestries on screen with our easy-to-enter listing.

RUN the program and a tapestry will appear on your TV set. When you're tired of it press the space bar and a new pattern will appear.

The program is very simple. Line 60 uses VDU19 to change the colours that will appear on screen. Since this VDU19 statement contains two RNDs it means that the colours that appear in the display will vary randomly.

Lines 70 and 80 set up two FOR...NEXT loops. You'll find the corresponding NEXTs in lines 110 and 120.

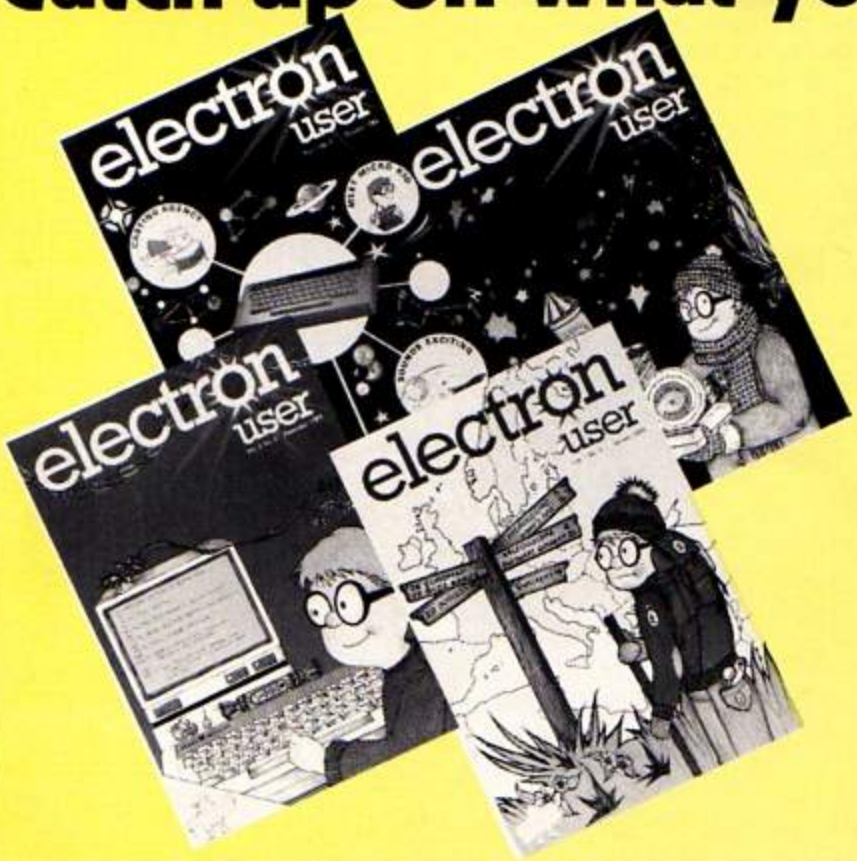
Lines 90 and 100 PRINT multicoloured blocks on the screen, the FOR...NEXT loops producing a rectangle of coloured blocks.

Line 130 just holds up the program after it has printed a pattern until a key is pressed.

Tapestry is only 14 lines in all but just see what these 14 lines can do!

```
10 REM (C) ELECTRON USER
20 REM by PAUL JONES
30 REM and PETE BIBBY
40 REPEAT
50 MODE 5
60 VDU 19,RND(4),RND(8)-1
   ,0,0,0
70 FOR I%=0 TO 19
80 FOR J%=0 TO 30
90 COLOUR (I%+J%)
   MOD 3+129
100 PRINT TAB(I%,J%)
   CHR$ (32);
110 NEXT J%
120 NEXT I%
130 WAIT$=GET$
140 UNTIL FALSE
```


Catch up on what you've missed!



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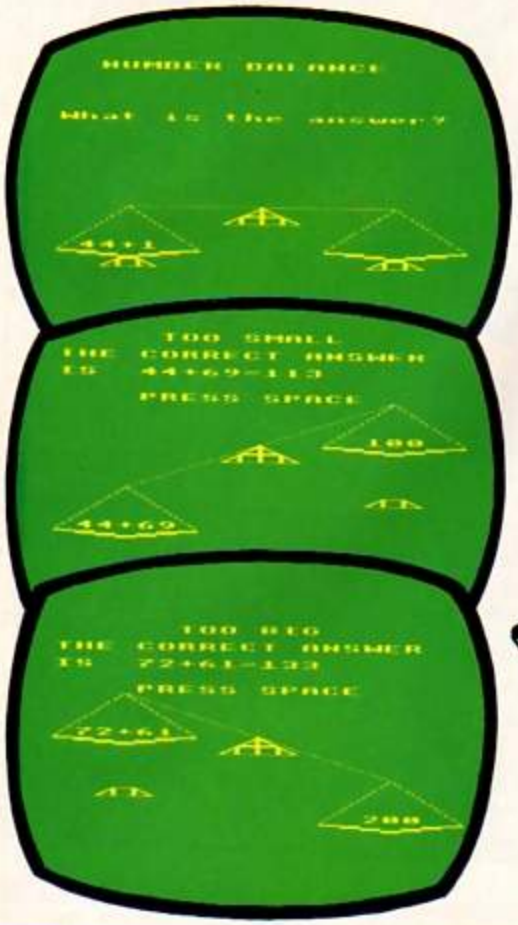


MAIN VARIABLES

GOES	This keeps count of the number of questions a person has been asked.
NUMQUES	This is the number of questions a person requires.
NUM1	The first of the two numbers to be added.
NUM2	The other number.
NAME$	The player's name.
HIGH	The highest number allowed in a question.
DISPLAY$	This is a string variable made from adding together NUM1 and NUM2 with a '+' between.
ANS	The correct answer.
ANS$	The string corresponding to ANS.
REPLY	The answer typed into the Electron.
REPLY$	The string corresponding to REPLY. REPLY$ is also used for the reply to the question "another go?".
SCORE	The number of correct answers.

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are on Page 4.

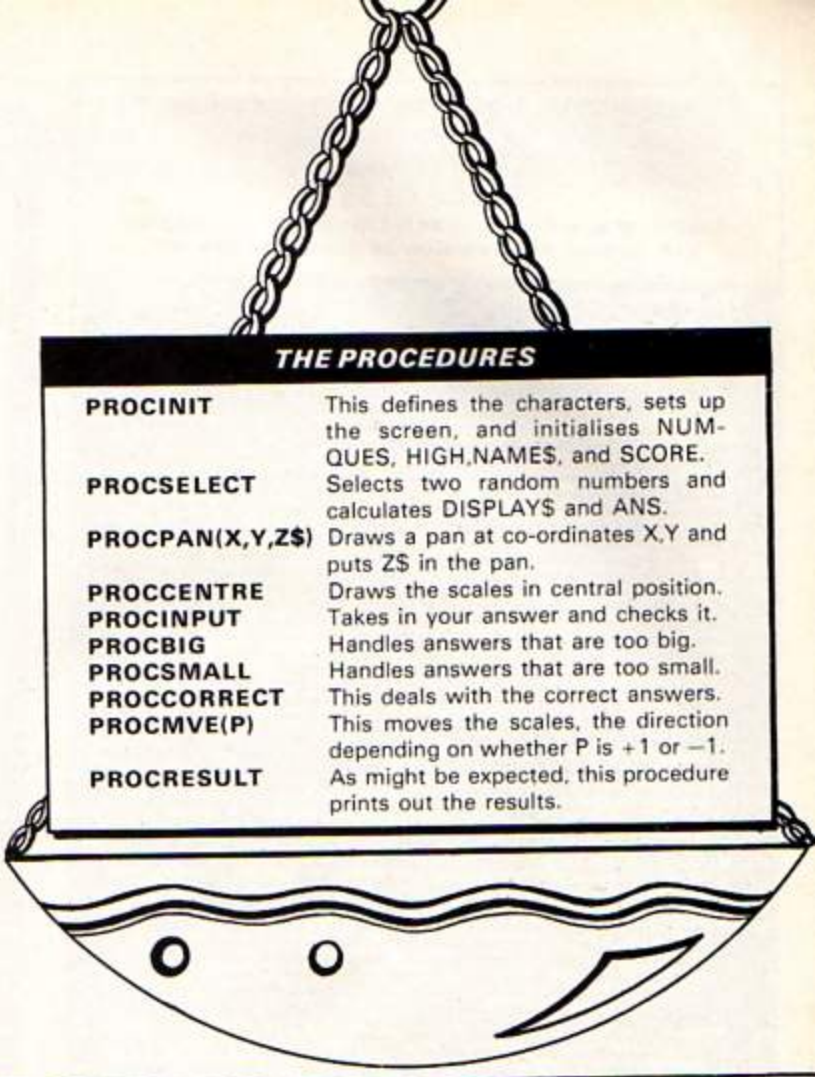
```
 10 REM BALANCE
 20 REM (C) Electron User
 30 MODE 2
    :VDU 23;8202;0;0;0;
 40 PROCINIT
 50 GOES=0
    :REPEAT
    :GOES=GOES+1
 60 PROCSELECT
 70 PROCCENTRE
 80 PROCINPUT
 90 UNTIL GOES=NUMQUES
100 PROCRESULT
110 IF LEFT$(REPLY$,1)="Y"
     OR LEFT$(REPLY$,1)=
    "y"
    THEN RUN
    ELSE MODE 6
    :END
120 DEF PROCINIT
130 VDU 23,230,255,129,129
    ,129,129,129,129,255
140 VDU 23,229,128,192,224
    ,176,152,140,134,255
150 VDU 23,228,1,3,7,13
    ,25,49,97,255
160 VDU 23,227,255,255,0
    ,0,0,0,0,0
170 VDU 23,226,0,255,255
    ,255,0,0,0,0
180 VDU 23,225,0,0,0,255
    ,255,255,0,0
190 VDU 23,224,0,0,0,0,0
    ,255,255,255
200 ENVELOPE 1,20,100,0
    ,0,0,0,0,126,0,0,-126
    ,126,126
210 ENVELOPE 2,10,128,0
    ,128,200,0,200,126,0
    ,0,-126,126,126
220 COLOUR 2
    :PRINT "  NUMBER BALANCE"
230 VDU 28,0,31,19,1
240 COLOUR 1
    :INPUT ''"How many questi
    ons"''"do you want"
    ,NUMQUES
250 IF NUMQUES<1
    THEN VDU 7
    :GOTO 240
260 COLOUR 6
    :INPUT '''"What is the
     highest"''"number in
     any"''"question to be"''
    "(2 TO 99)",HIGH
270 IF HIGH<2 OR HIGH>99
    THEN VDU 7
    :GOTO 260
280 COLOUR 3
    :INPUT '"What is your
     name?"''NAME$
290 SCORE=0
300 ENDPROC
310 DEF PROCSELECT
320 NUM1=RND(HIGH)
330 NUM2=RND(HIGH)
340 DISPLAY$=RIGHT$(" "+
    STR$ (NUM1),2)+"+"+
    LEFT$(STR$ (NUM2)+" "
    ,2)
350 ANS=NUM1+NUM2
360 ENDPROC
370 DEF PROCPAN(X,Y,DISPLAY$)
380 COLOUR 5
390 PRINT TAB(X,Y-3)"
          "
400 PRINT TAB(X,Y-2)"
          "
410 PRINT TAB(X,Y-1)"
          "
420 PRINT TAB(X,Y)"
          "
430 PRINT TAB(X,Y+1)"
          "
440 PRINT TAB(X,Y+2)" "+DISPL
    AY$+" "
450 COLOUR 6
460 VDU 31,X,Y+3,227,226
    ,225,224,225,226,227
470 PRINT TAB(X,Y+4)"
          "
480 MOVE X*64,896-32*Y
    :DRAW X*64+223,1055-32*Y
    :MOVE X*64+224,1055-32*Y
    :DRAW X*64+447,896-32*Y
490 ENDPROC
500 DEF PROCCENTRE
510 CLS
520 PROCPAN(0,18,DISPLAY$)
    :L=480
530 PROCPAN(13,18,"     ")
    :R=480
540 COLOUR 1
550 VDU 31,9,16,228,229
    ,10,8,8,8,228,230,230
    ,229
560 VDU 31,2,22,228,230
    ,229,31,15,22,228,230
    ,229
570 MOVE 224,L
```

BALANCE tests your powers of mental arithmetic by giving you a sum to do. The sum appears on one side of a set of scales, and the answer you type in appears on the other.

The pans of the scales balance when the answer is correct, otherwise they tilt.

It's not always easy but it is colourful and fun to play.

It all adds p to a very lanced game



THE PROCEDURES

PROCINIT	This defines the characters, sets up the screen, and initialises NUMQUES, HIGH,NAME$, and SCORE.
PROCSELECT	Selects two random numbers and calculates DISPLAY$ and ANS.
PROCPAN(X,Y,Z$)	Draws a pan at co-ordinates X,Y and puts Z$ in the pan.
PROCCENTRE	Draws the scales in central position.
PROCINPUT	Takes in your answer and checks it.
PROCBIG	Handles answers that are too big.
PROCSMALL	Handles answers that are too small.
PROCCORRECT	This deals with the correct answers.
PROCMVE(P)	This moves the scales, the direction depending on whether P is +1 or −1.
PROCRESULT	As might be expected, this procedure prints out the results.

```
    :DRAW 1055,R
580 ENDPROC
590 DEF PROCINPUT
600 VDU 7
    :COLOUR 3
    :PRINT TAB(0,5)"What
     is the answer?"
    :COLOUR 5
610 REPLY$=""
    :ANS$=STR$ (ANS)
    :FOR I=1TO LEN (ANS$)
620 A=GET
    :IF A<>13AND (A<48
    OR A>57)
    THEN 620
    ELSE A$=CHR$ (A)
    : PRINT TAB(14+I,20)A$
    :REPLY$=REPLY$+A$
    :NEXT
    :REPLY=VAL (REPLY$)
630 REPLY$=LEFT$(" "+REPLY$+
    "    ",5)
640 IF ANS=REPLY
    THEN SOUND 0,2,1,50
    :PROCCORRECT
650 IF ANS>REPLY
    THEN SOUND 0,1,10,40
    :PROCSMALL
660 IF ANS<REPLY
    THEN SOUND 0,1,10,40
    :PROCBIG
670 IF GET <>32
    THEN 670
680 ENDPROC
690 DEF PROCBIG
700 COLOUR 9
    :PRINT TAB(6,3)"TOO BIG"
    TAB(0,5)STRING$(19,"
     ")
710 PROCMVE(-1)
720 COLOUR 10
    :PRINT TAB(0,5)"THE CORRE
    CT ANSWER"''"IS  "DISPLAY
    $;"="ANS$;''
    :COLOUR 8
    :PRINT "    PRESS SPACE"
730 ENDPROC
740 DEF PROCSMALL
750 COLOUR 9
    :PRINT TAB(5,3)"TOO SMALL
    "TAB(0,5)STRING$(19
    ," ")
760 PROCMVE(1)
770 COLOUR 10
    :PRINT TAB(0,5)"THE CORRE
    CT ANSWER"''"IS  "DISPLAY
    $;"="ANS$;''
    :COLOUR 8
    :PRINT "    PRESS SPACE"
780 ENDPROC
790 DEF PROCMVE(P)
800 YL=18
    :YR=18
810 FOR I=1TO 5
820 GCOL 3,7
    :MOVE 224,L
    :DRAW 1055,R
830 YL=YL+P
    :YR=YR-P
    :L=-1*32*P+L
    :R=32*P+R
840 PROCPAN(0,YL,DISPLAY$)
850 PROCPAN(13,YR,REPLY$)
860 GCOL 0,7
    :MOVE 224,L
    :DRAW 1055,R
870 FOR J=1TO 500
    :NEXT
880 NEXT
890 ENDPROC
900 DEF PROCRESULT
910 VDU 7
    :CLS
    :COLOUR 3
    :PRINT ''"RESULTS:-"''
    "       "
    "-------"
920 COLOUR 6
    :PRINT ''"You got ";
    :COLOUR 1
    :PRINT STR$ (SCORE)
    :COLOUR 6
    :PRINT '"questions right"
    ''"out of the ";
    :COLOUR 1
    :PRINT STR$ (NUMQUES)
    :COLOUR 6
    :PRINT '"questions that
     you"''"tried"
930 COLOUR 10
    :PRINT ''''"Do you want
     another"''"try? Answer
     yes or"''"no, then RETURN"
940 INPUT '""REPLY$
    :ENDPROC
950 DEF PROCCORRECT
960 SCORE=SCORE+1
970 CLS
    :PRINT ''
    :FOR I=1TO 10
    :COLOUR RND(15)
    :PRINT "WELL DONE ";
    :COLOUR RND(15)
    :PRINT NAME$
    :NEXT
980 PRINT
    :FOR I=1TO 10
    :COLOUR RND(15)
    :PRINT "YOU ARE RIGHT"
    :NEXT
990 COLOUR 7
    :PRINT ''"    PRESS SPACE
    ";
1000 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 9.

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- **Each SPRITE actually has TWO images which given slight differences will achieve the animation effects when the two are alternated. Or, if you choose, give the two images totally different designs and you have created two SPRITES out of one, usable alternately. This technique can also be applied to the CLONES which means that all 32 SPRITES can be animated, multi-coloured, moving objects!!!**
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BOOKSHELF

21 Games for the Electron
Mike James, S.M. Gee and Kay Ewbank
Granada £5.95

BOOKS of games listings for micros always appear to be much of a muchness. The games seem to be the same, the listings are usually poor and the standard of explanation low.

Happily, none of the above applies to 21 Games for the Electron.

As you might expect, the old favourite games are there, supplying the Space Invader and Downhill Racer type of arcade action. Others have titles which sound familiar but are in fact new versions of old favourites.

Along with these come the Electron varieties of parlour games such as noughts and crosses and a version of the old sliding tile puzzle.

However it's not just the range of the games that is pleasing. It is also the way they are presented.

Each listing has a full description along with a screen picture showing you what to expect when you've typed it in. You also get hints on how to enter the program, and warnings of possible errors and how to remedy them.

This in itself is unusual but what is even more uncommon and valuable is that each listing comes with a description of how it does what it does and ways you can improve it.

The idea is that you don't just passively type in the games but learn how they work and be encouraged to alter them.

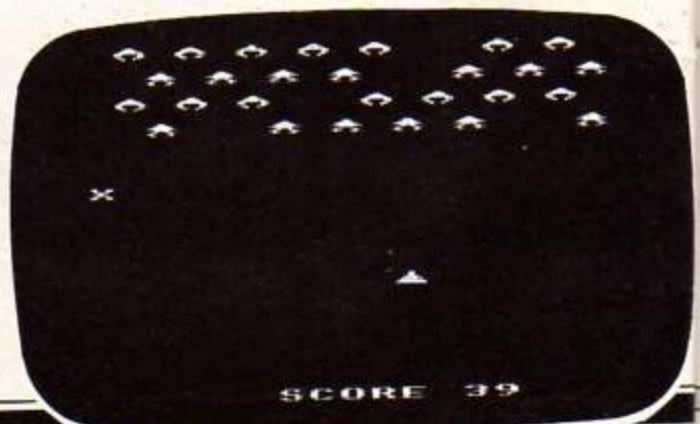
This takes it beyond the normal range of games recipe books and makes it something that can also be read for both pleasure and learning.

Given this, the variety of the games, and the fact that the listings are clear and easy to enter, the book is good value for money and well worth consideration.

One minor point to watch out for is that the book is a translation of one for the BBC Micro, and I've found a small error. At one point Mode 7 is used, which is a pity as the Electron doesn't have it!

Still, this is easily remedied and it's no bad thing to instil a little caution into the user. Nor does it detract from a book of games listings which sets the standard for similar books.

Trevor Roberts



Positron Invaders listing

```
10 REM POSITRON INVADERS

15 REM 21 GAMES FOR THE
   ELECTRON
16 REM GRANADA PUBLISHING

20 MODE 5
30 VDU 19,0,3,0,0,0
40 VDU 19,1,4,0,0,0
50 VDU 19,2,1,0,0,0
60 VDU 19,3,2,0,0,0
70 *FX 4,1
80 *FX 12,1
90 *FX 11,1
100 VDU 23,1;0;0;0;0
110 VDU 23,224,&18,&3C,&7E
    ,&FF,&C3,&C3,&66,&24

120 VDU 23,225,&18,&3C,&7E
    ,&FF,&3C,&66,&C3,&66

130 VDU 23,226,&18,&18,&18
    ,&3C,&7E,&7E,&FF,&FF

140 VDU 23,227,&28,&88,&91
    ,&28,&1C,&34,&A4,&A4

150 Y=1
160 XL=10
170 YM=0
180 T=0
190 S=0
200 J=0
210 K=0
220 A$=STRING$(8,CHR$ (224)+
    " ")
230 B$=STRING$(8," "+
    CHR$ (225))
240 C$=A$
250 D$=B$
260 E$=STRING$(16," ")
270 COLOUR 3
280 PRINT TAB(0,14);"X"
290 J=NOT J
300 IF K=1
    THEN GOTO 600
310 IF T>40+RND(15)
    THEN PRINT TAB(1,Y);E$
    :Y=Y+2
    :T=0
    :SOUND &0011,0,0,1
320 IF J
    THEN A$=FNM(A$)
    ELSE A$=FNR(A$)
330 COLOUR 2
340 PRINT TAB(1,Y);A$
350 SOUND 1,-15,121-Y*8
    ,5
360 PROCMOVE
370 IF J
    THEN B$=FNM(B$)
    ELSE B$=FNR(B$)
380 COLOUR 1
390 PRINT TAB(1,Y+2);B$
400 SOUND 1,-15,129-Y*8
    ,5
410 PROCMOVE
420 C$=FNM(C$)
430 COLOUR 2
440 PRINT TAB(1,Y+4);C$
450 SOUND 1,-15,121-Y*8
    ,5
460 PROCMOVE
470 D$=FNR(D$)
480 COLOUR 1
490 PRINT TAB(1,Y+6);D$
500 SOUND 1,-15,129-Y*8
    ,5
510 PROCMOVE
520 IF Y>8 AND D$<>E$
    THEN GOTO 580
530 IF Y>10 AND C$<>E$
    THEN GOTO 580
540 IF Y>12 AND B$<>E$
    THEN GOTO 580
550 IF Y>14 AND A$<>E$
    THEN GOTO 580
560 T=T+1
570 GOTO 270
580 PRINT TAB(1,23);" THEY
    GOT YOU!!"
590 GOTO 610
600 PRINT TAB(1,23);"WELL
    DONE !"'"YOU SAVED THE
    WORLD!"
610 *FX 15,1
620 *FX 4,0
630 *FX 12,0
640 SOUND &0011,0,0,1
650 IF K=0
    THEN SOUND &0010,-15
    ,4,20
660 INPUT "ANOTHER GAME Y/N"
    ,A$
670 A$=LEFT$(A$,1)
680 IF A$="Y"
    THEN RUN
690 *FX 4,0
700 *FX 12,0
710 VDU 20
720 MODE 6
730 END
740 DEF PROCMOVE
750 A=INKEY (0)
760 *FX 15,1
770 T=T+1
780 COLOUR 3
790 PRINT TAB(XL,21);
    CHR$ (226)
800 IF A=-1
    THEN ENDPROC
810 PRINT TAB(XL,21);" "
820 IF A=&88 AND XL>1
    THEN XL=XL-1
830 IF A=&89 AND XL<16
    THEN XL=XL+1
840 COLOUR 3
850 PRINT TAB(XL,21);
    CHR$ (226)
860 IF A=&8B
    THEN PROCFIRE
870 ENDPROC
880 DEF PROCFIRE
890 COLOUR 3
900 FOR M=19 TO Y+6 STEP -1
910 PRINT TAB(XL,M);":";
920 PRINT TAB(XL,M+1);" "
930 NEXT
940 PRINT TAB(XL,M+1);" "
950 F=0
960 Q$=D$
970 R=6
980 PROCHIT
990 D$=Q$
1000 IF F=1
    THEN GOTO 1220
1010 COLOUR 3
1020 PRINT TAB(XL,Y+5);".";
    TAB(XL,Y+5);" ";TAB(XL
    ,Y+4);".";TAB(XL,Y+4);
    " "
1030 Q$=C$
1040 R=4
1050 PROCHIT
1060 C$=Q$
1070 IF F=1
    THEN GOTO 1220
1080 COLOUR 3
1090 PRINT TAB(XL,Y+3);".";
    TAB(XL,Y+3);" ";TAB(XL
    ,Y+2);".";TAB(XL,Y+2);
    " "
1100 Q$=B$
1110 R=2
1120 COLOUR 3
1130 PROCHIT
1140 B$=Q$
1150 IF F=1
    THEN GOTO 1220
1160 PRINT TAB(XL,Y+1);".";
    TAB(XL,Y+1);" ";TAB(XL
    ,Y);".";TAB(XL,Y);" "
1170 Q$=A$
1180 R=0
1190 COLOUR 3
1200 PROCHIT
1210 A$=Q$
1220 IF A$=E$ AND B$=E$
    AND C$=E$ AND D$=E$

    THEN K=1
1230 IF Q$=E$
    THEN PRINT TAB(1,Y);E$
    :Y=Y+2
1240 ENDPROC
1250 DEF PROCHIT
1260 IF MID$(Q$,XL,1)=" "

    THEN ENDPROC
1270 Q$=MID$(Q$,1,XL-1)+"
     "+MID$(Q$,XL+1)
1280 F=1
1290 S=S+10-Y
1300 COLOUR 3
1310 PRINT TAB(XL,Y+R);
    CHR$ (227)
1320 SOUND &0010,-15,4,3
1330 PRINT TAB(6,30);"SCORE
     ";S;"  ";
1340 T=T-RND(3)
1350 ENDPROC
1360 DEF FNM(Q$)=MID$(Q$
    ,2)+LEFT$(Q$,1)
1370 DEF FNR(Q$)=RIGHT$(Q$
    ,1)+LEFT$(Q$,LEN (Q$)-1)
```

Positron Invaders is just one of the games you'll find in "21 Games for the Electron", reviewed opposite. We are grateful to Granada for permission to reproduce the game.

Make doilies galore!

By MIKE COOK

THE Electron Automatic Doily Maker does just that!

It produces an endless series of coloured patterns in the shape of paper doilies.

When you run the program you'll be asked how many patterns should overlap. Start off with three and then see how you go.

It's great fun and very soothing.

You never knew your Electron could be so calming!

```
10 MODE 6
20 PRINT "Electron Automatic
    Doily Maker"
30 REM (C) Electron User
40 REM Febuary 1984
50 PRINT "By Mike Cook"
60 PRINT
70 INPUT "How many patterns
    should overlap",L%
71 IF L% < 1
   THEN 70
80 DIM OX%(L%,4),OY%(L%,4)
90 DIM SX%(4),SY%(4)
100 BLACK=0
110 WHITE=1
120 FOR A%=0 TO 1
130 FOR B%=1 TO 4
140 OX%(A%,B%)=0
150 OY%(A%,B%)=0
160 SX%(B%)=1
    :SY%(B%)=1
170 NEXT
180 NEXT
190 SX%(2)=-1
    :SX%(3)=-1
200 SY%(3)=-1
    :SY%(4)=-1
220 MODE 2
230 VDU 29,640;512;
240 VDU 23,1,0;0;0;0;
250 N%=1
260 REPEAT
270 GCOL 3,RND(7)
280 FOR A%=1 TO 4
290 V%=RND(40)
300 OX%(N%,A%)=V%*16
310 OY%(N%,A%)=V%*12.8
320 NEXT
330 FOR A%=1 TO 4
340 FOR B%=1 TO 4
350 FOR C%=1 TO 4
360 MOVE SX%(C%)*OX%(N%
    ,B%),0
370 DRAW 0,SY%(C%)*OY%(N%
    ,A%)
380 NEXT
    :NEXT
    :NEXT
390 FOR A%=1 TO 3000
    :NEXT
400 N%=N%+1
401 IF N%>L%
    THEN N%=0
410 FOR A%=1 TO 4
420 FOR B%=1 TO 4
430 FOR C%=1 TO 4
440 MOVE SX%(C%)*OX%(N%
    ,B%),0
450 PLOT 7,0,SY%(C%)*OY%(N%
    ,A%)
460 NEXT
    :NEXT
    :NEXT
470 UNTIL BLACK=WHITE
```

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By CHRIS BARTON

MATHS workout

Exercises for the Electron

AS you'll see from several of the programs in this month's *Electron User*, your Electron is capable of doing a lot of calculations in a very short time. It's good at sums, as some might say.

In fact everything a micro can do, from the noises it makes to the high-speed graphics of an action game, is the result of its ability to add, subtract, multiply and divide, quickly and accurately.

Happily most of these arithmetical operations, as they're known, are taken care of by the Electron itself and you don't have to know all that much about it. It's done automatically.

However, there will come a time when you'll want to write your own programs, and then it will help to have a knowledge of how the Electron handles calculations. It's not too hard to learn.

Adding and subtracting is easy. Suppose that you want to add 3 and 4. All you do is type:

```
PRINT 3+4
```

into your Electron. You'll get "+" by pressing SHIFT and the ";" key at the same time. Then press the Return key and the answer, 7, will be flashed up on the screen.

In fact to add two numbers you don't even have to use the PRINT command. The trouble is that if you leave it out the Electron will just add the numbers up and won't display the answer!

Try the following sums and see what happens:

```
PRINT 123+789
PRINT 23+14
PRINT 4+3+2+1
PRINT 76+43+67
```

You'll notice that you can add together several items in one line with no problem. When you have a series of numbers separated by addition signs (or subtraction, multiplication or division signs) it's known as an expression. For example:

```
PRINT 5+6+7
```

will cause the Electron to add together the numbers that make up the expression 5+6+7 and display the result (provided you remember to press the Return key, which I won't mention again).

It's the same with subtractions, where you take one number away from another. You'll find the minus sign, "—", at the top right of the keyboard.

Get your Electron to solve the following expressions:

```
4—2
80—3—7
14—78
```

You'll notice that in the last one you're taking a larger number away from a smaller. Will the Electron allow you to do that? Well, type in:

```
PRINT 14-78
```

and you'll get the answer.

As you can see, the micro shows the difference as a negative number. Without going into the theory too much, you can look on this as the amount "owed" as a result of the calculation.

You can mix up both additions and subtractions in an expression as the following examples make clear:

```
PRINT 10+3-4
PRINT 73-45-18
PRINT 2+5-3+8
```

Try a few additions and subtractions of your own making. As you can see, the Electron is extremely fast at doing its sums.

The same applies when you use it to multiply or divide numbers.

One point to be careful of is that the Electron uses special symbols for both multiplication and division, not the ones that you're used to.

If you want to multiply one number by another then you use the asterisk, "*". This is on the key next to the "+".

You'll have to press the Shift key to get at it. So to multiply 7 by 8 we enter:

```
PRINT 7*8
```

Try the following multiplications to get the hang of it:

```
PRINT 1*1
PRINT 20*5
PRINT 7*7
PRINT 2*4*6
```

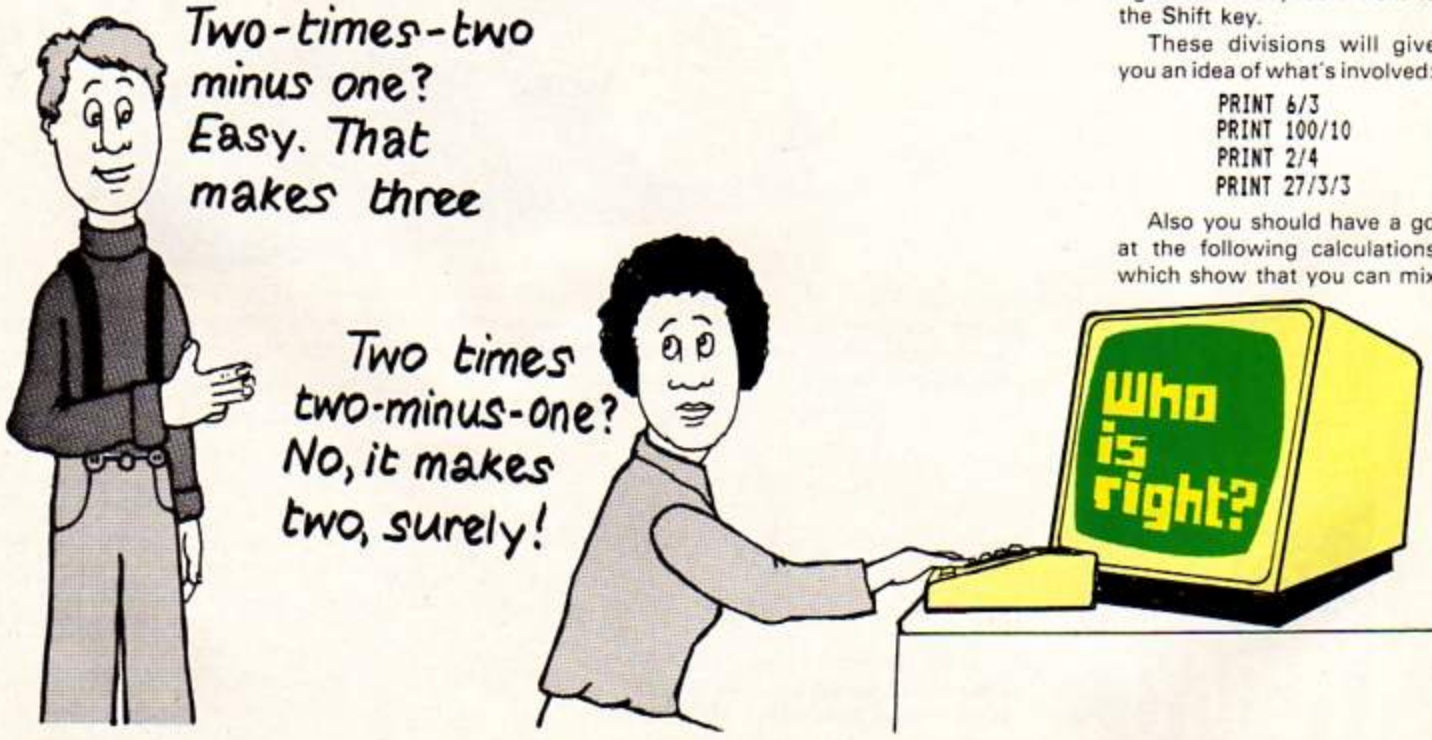
As you can see, the Electron can handle more than one multiplication in an expression.

It's the same when we come to division, although here we have to use the special sign for division, "/". You'll find this at the bottom right of the keyboard next to the Shift key.

These divisions will give you an idea of what's involved:

```
PRINT 6/3
PRINT 100/10
PRINT 2/4
PRINT 27/3/3
```

Also you should have a go at the following calculations which show that you can mix



the division and multiplication signs quite happily in one expression:

```
PRINT 3*6/9
PRINT 36/4*8
PRINT 2/3/2*3
```

So far in this guide to using your Electron to do sums we've covered addition, subtraction, multiplication and division.

We've come across the special signs "*" and "/" which, although different from the ones we are used to, work in the same way.

We've seen that you can mix addition and subtraction in the same PRINT statement and that you can do the same with multiplication and division.

Can all four be mixed up together?

Can you add, take away, multiply and divide, all in the same expression?

The answer is yes, provided that you follow some simple rules.

First of all let's see why you need these rules.

Suppose you asked a group of people to do the following bit of mental arithmetic:

"What is 2 times 2 take away 1?"

What would happen is that you would get two answers to the one problem. One group of people would say the answer was 3, the other would say that it was 2.

The first group has done the multiplication, 2 times 2, first. This made 4. Then they subtracted 1 from it to get the answer 3.

The second lot have done the take away first. This is 2 minus 1, giving 1. They then moved on to do the multiplication and, since 2 times 1 is 2, they gave the answer 2.

It's a bit of a problem, isn't it? You get a different answer according to whether you start with the subtraction or the multiplication.

And it gets worse. Suppose you had an expression like 3*4–9/3+2

How many different ways of working it out are there? Do you do the addition first or the division?

Obviously there has to be a rule to cover all this and it's given the grand title of "operator precedence".

The rule sounds complicated but is quite easy when you actually use it.

In order to sort out an expression the Electron works out the multiplications and divisions first (it doesn't matter which) and then the additions and subtractions.

It starts at the left side of the expression and moves towards the right as it does this.

Let's see what this means to our earlier problem, 2 times 2 take away 1.

We do the multiplications and divisions first so we multiply 2 by 2 to get four. Then we do the additions and subtractions, in this case taking 1 away from 4, which results in the answer 3.

To see that this is the way the Electron tackles the problem type in:

```
PRINT 2*2-1
```

and see the result.

That's fairly easy, but what about 3*4–9/3+2? How does the rule apply here?

Let's go through it stage by stage and see.

First of all we start at the left and do the divisions as we come to them. There's only one, 9/3, which results in 3. Thus the expression becomes:

3*4–3+2

Now we do the multiplications, starting from the left again and working our way through.

There's only one, 3*4, which is 12, so the expression becomes:

12–3+2

Next we do the additions which results in:

14–3

Then the subtractions which results in:

11

The answer to the calculation 3*4–9/3+2 is 11.

Try it out on your Electron with:

```
PRINT 3*4-9/3+2
```

Golden Rules

*** before + except after (**

( )

then

/

then

*****

then

+

then

–

and you'll get the same answer.

It's much easier to do than to describe or read about. Try using the rule on the following expressions and then check your answers with the Electron's:

3*3–2/2+6*7
2–1+3/6*18
33/3+7*2/5/5

Remember this is the rule that the Electron will apply consistently in any calculations you ask it to do.

Thus the answer to "What is 2 times 2 take away 1?" is 3.

But what if you had meant "What is 2 times 2 take away 1? "to be calculated by doing the take away first, then the multiplication? This would give the answer 1.

As this might be the way that the calculation has to be done if your program is going to work, is there any way of getting the Electron to do it like this?

The answer is that there is and it involves the use of the brackets "(" and ")" that you'll find on the 8 and 9 keys.

If you want part of an expression to be done first then you put it in brackets. The Electron will read the expression from left to right as before but it will work out the bits in brackets first before going on to the divisions and so on. Try:

```
PRINT 2*2-1
```

and:

```
PRINT 2*(2-1)
```

Notice the difference? In the first one the multiplication is done first, then the subtraction.

In the second the part in brackets is worked out first (in this case it's a subtraction), then the multiplication is done.

Have a go at the following on your micro and see if you understand the differing results you get with different positions of the brackets:

```
PRINT 60/4+2-1
PRINT 60/(4+2)-1
PRINT 60/(4+2-1)
```

Don't just stop with these, but make up your own sums and see if the answers you get are the same as the Electron's.

Once you've got the hang of "operator precedence" then using your Electron to give you consistent, correct answers to your mathematical problems will be easy.

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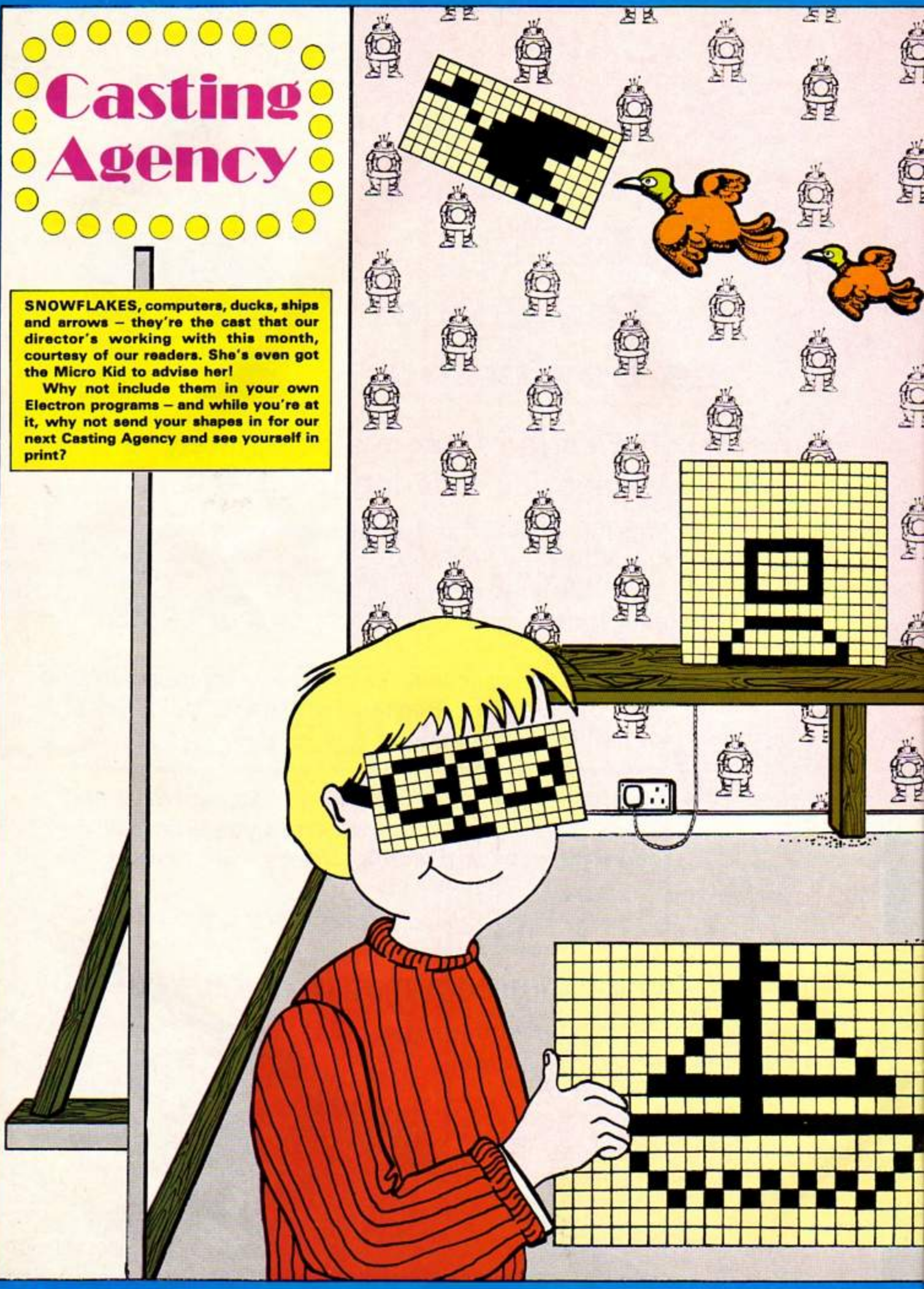
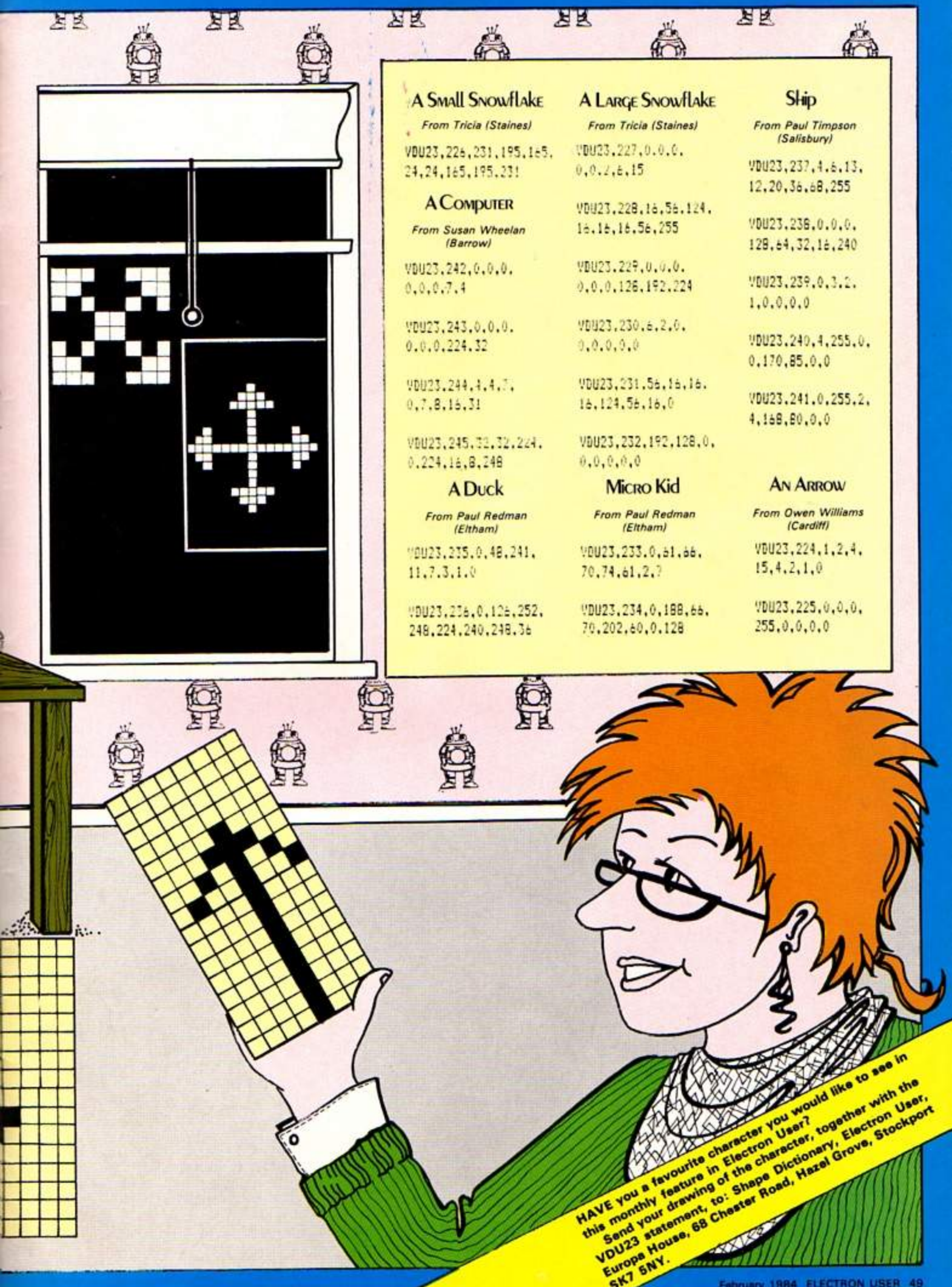
Casting Agency

SNOWFLAKES, computers, ducks, ships and arrows – they're the cast that our director's working with this month, courtesy of our readers. She's even got the Micro Kid to advise her!

Why not include them in your own Electron programs – and while you're at it, why not send your shapes in for our next Casting Agency and see yourself in print?





A Small Snowflake

From Tricia (Staines)

```
VDU23,226,231,195,165,
24,24,165,195,231
```

A Large Snowflake

From Tricia (Staines)

```
VDU23,227,0,0,0,
0,0,2,6,15

VDU23,228,16,56,124,
16,16,16,56,255

VDU23,229,0,0,0,
0,0,0,126,192,224

VDU23,230,6,2,0,
0,0,0,0,0

VDU23,231,56,16,16,
16,124,56,16,0

VDU23,232,192,128,0,
0,0,0,0,0
```

Ship

From Paul Timpson (Salisbury)

```
VDU23,237,4,6,13,
12,20,36,68,255

VDU23,238,0,0,0,
128,64,32,16,240

VDU23,239,0,3,2,
1,0,0,0,0

VDU23,240,4,255,0,
0,170,85,0,0

VDU23,241,0,255,2,
4,168,80,0,0
```

A Computer

From Susan Wheelan (Barrow)

```
VDU23,242,0,0,0,
0,0,0,7,4

VDU23,243,0,0,0,
0,0,0,224,32

VDU23,244,4,4,7,
0,7,8,16,31

VDU23,245,32,32,224,
0,224,16,8,248
```

A Duck

From Paul Redman (Eltham)

```
VDU23,235,0,48,241,
11,7,3,1,0

VDU23,236,0,126,252,
248,224,240,248,36
```

Micro Kid

From Paul Redman (Eltham)

```
VDU23,233,0,61,66,
70,74,61,2,7

VDU23,234,0,188,66,
70,202,60,0,128
```

An Arrow

From Owen Williams (Cardiff)

```
VDU23,224,1,2,4,
15,4,2,1,0

VDU23,225,0,0,0,
255,0,0,0,0
```

HAVE you a favourite character you would like to see in this monthly feature in Electron User? Send your drawing of the character, together with the VDU23 statement, to: Shape Dictionary, Electron User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Could YOU make a crash landing on the moon?

LUNAR LANDER – By Chris Price

LUNAR Lander gives you the chance to play one of the classic computer games on your micro.

The story goes that, owing to an interstellar catastrophe, you've had to leap into your escape capsule and head for the comparative safety of the Moon.

The trouble is that the ship is a bit primitive, with very few instruments and controls.

You've only got a limited amount of fuel and the lunar surface is coming up fast.

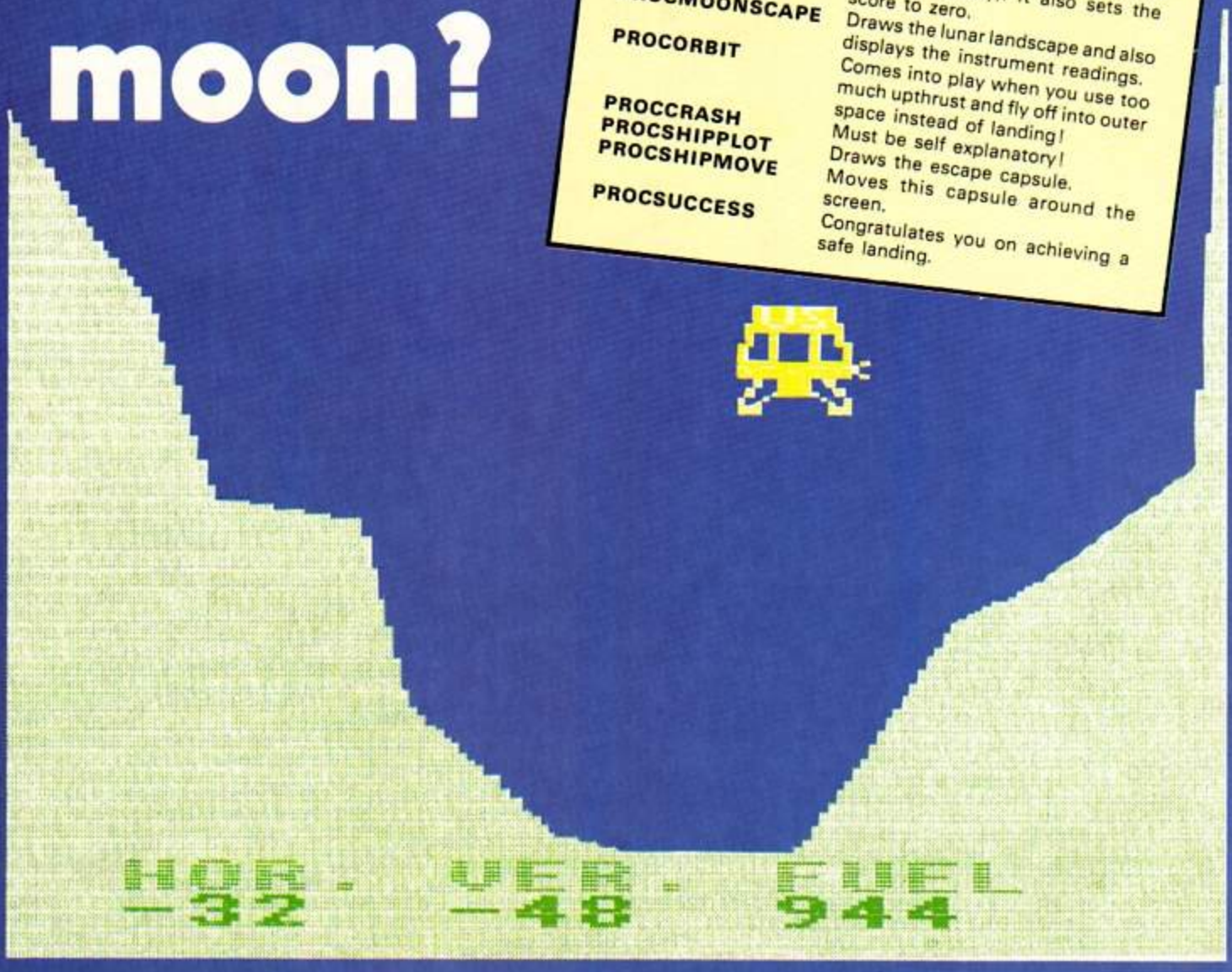
Add to all this that there's only one place you can land safely and you'll see the problems.

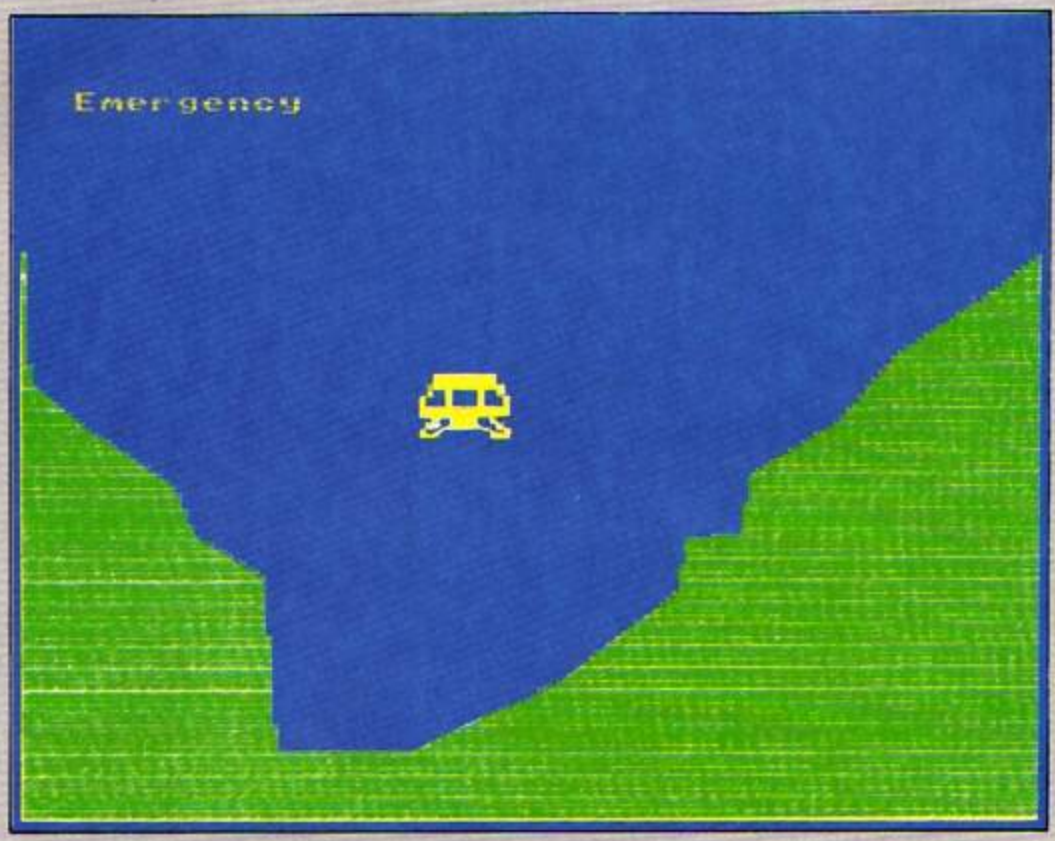
Could you survive in such an emergency?

Play Lunar Lander and find out!

The procedures *(below)* are fairly straightforward.

PROCINSTRUCT	Flashes the game's instructions onto the screen.
PROCINITIAL	Sets up all the user defined characters (just like the ones in Casting Agency). It also sets the score to zero.
PROCMOONSCAPE	Draws the lunar landscape and also displays the instrument readings.
PROCORBIT	Comes into play when you use too much upthrust and fly off into outer space instead of landing!
PROCCRASH	Must be self explanatory!
PROCSHIPPLOT	Draws the escape capsule.
PROCSHIPMOVE	Moves this capsule around the screen.
PROCSUCCESS	Congratulates you on achieving a safe landing.






```
 10 REM (C) ELECTRON USER
 20 MODE 1
 30 PROCINSTRUCT
 40 PROCINITIAL
 50 GAME=1
    :REPEAT
    :OVER=0
    :MODE 5
 60 PROCMOONSCAPE
 70 REPEAT
 80 PROCSHIPMOVE
 90 UNTIL OVER
100 IF OVER=-1
    THEN PROCCRASH1
110 MODE 6
    :IF OVER=1
    THEN PROCSUCCESS
    ELSE IF OVER=2
    THEN PROCORBIT
    ELSE PROCCRASH
120 PRINT ''TAB(12)"Your
    score was ";SCORE
130 IF SCORE>=HISCORE

    THEN HISCORE=SCORE
    :PRINT ''"    THIS
    IS THE HIGHEST SCORE
    SO FAR"
    ELSE PRINT ''"    The
    highest score so far
    is ";HISCORE
140 PRINT ''TAB(7)"Another
    game? Press Y or N"
150 GAME=GET -78
    :IF GAME<>ANDD GAME<>11
    THEN 150
160 UNTIL GAME=0
170 END
180 DEF PROCINITIAL
190 VDU 23,255,1,1,1,55
    ,55,59,27,237
200 VDU 23,254,50,132
    ,0,8,8,4,36,18
210 VDU 23,253,254,254
    ,254,192,192,192,192
    ,0
220 VDU 23,252,128,128
    ,128,236,236,220,216
    ,183
230 VDU 23,251,76,33,0
    ,16,16,32,36,72
240 VDU 23,250,127,127
    ,127,3,3,3,3,0
```

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are on Page 4.

```
250 VDU 23,249,3,219,219
    ,217,221,221,221,1
260 VDU 23,248,252,36
    ,36,38,34,34,34,254
270 VDU 23,247,192,219
    ,219,155,187,187,187
    ,128
280 VDU 23,246,63,36,36
    ,100,68,68,68,127
290 VDU 23,245,255,255
    ,255,7,7,7,7,3
300 VDU 23,244,0,0,0,112
    ,64,32,16,112
310 VDU 23,243,0,0,0,248
    ,248,248,248,252
320 VDU 23,242,255,255
    ,255,224,224,224,224
    ,192
330 VDU 23,241,0,0,0,9
    ,9,9,9,6
340 VDU 23,240,0,0,0,31
    ,31,31,31,63
350 VDU 23,239,255,255
    ,255,248,248,248,0
    ,0
360 VDU 23,238,175,143
    ,143,248,248,248,0
    ,0
370 VDU 23,237,245,241
    ,241,31,31,31,0,0
380 VDU 23,236,255,255
    ,255,31,31,31,0,0
390 VDU 23,235,24,60,36
    ,90,0,0,0,0
400 VDU 23,234,36,66,126
    ,36,219,0,0,0
410 VDU 23,233,126,255
    ,255,255,0,0,0,0
420 VDU 23,232,128,64
    ,64,128,0,0,0,0
430 VDU 23,231,0,64,64
    ,0,0,0,0,0
440 VDU 23,230,32,64,64
    ,32,0,0,0,0
450 HISCORE=0
460 ENDPROC
470 DEF PROCSHIPPLOT
480 VDU 25,4,X;Y;18,0
    ,3,240,243,8,8,18
    ,0,1,241,244,8,8,18
    ,0,0,242,245,8,8,10
    ,247,249,8,8,18,0
    ,3,246,248,8,8,10
    ,250,253,8,8,18,0
    ,0,252,255,8,8,18
    ,0,2,251,254,8,8,10
    ,18,1,2,239,236,8
    ,8,18,3,2,238,237
    ,18,0,0,25,4,X+32;Y-92;
    233
490 IF MT=1
```

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Lunar Lander listing

From Page 51

```
    THEN VDU 25,4,X+32;Y-96
    :18,0,3,235,8,18,3
    ,2,234
500 IF ST=-1
    THEN VDU 25,4,X-8;Y-60;
    18,0,2,231,8,18,3
    ,3,232
510 IF ST=1
    THEN VDU 25,4,X+112;Y-6
    0;18,0,2,231,8,18
    ,3,3,230
520 ENDPROC
530 DEF PROCSHIPMOVE
540 VDU 4
    :COLOUR 129
    :PRINT TAB(3,30);SX
    "  "TAB(8,30);SY"
     "TAB(13,30);FUEL"
      "
550 VDU 5
    :IF FUEL<0
    THEN 620
560 IF MT=1
    THEN VDU 25,4,X+32;Y-96
    :18,3,2,234,8,18,0
    ,0,233
570 IF ST=1
    THEN VDU 25,4,X+112;Y-6
    0;18,0,0,230
580 IF ST=-1
    THEN VDU 25,4,X-8;Y-60;
    18,0,0,232
590 IF INKEY (-98)
    THEN SY=SY+5
    :MT=1
    :FUEL=FUEL-10
    :SOUND 16,-12,6,10
    ELSE MT=0
600 IF INKEY (-103)
    THEN SX=SX+1
    :ST=-1
    :FUEL=FUEL-3
    :SOUND 16,-12,6,10
    ELSE ST=0
610 IF INKEY (-104)
    THEN SX=SX-1
    :ST=1
    :FUEL=FUEL-1
    :SOUND 16,-12,6,10
620 SY=SY-1
    :IF ABS (SY)>48
    THEN SY=SGN (SY)*48
630 IF ABS (SX)>32
    THEN SX=SGN (SX)*32
640 X=X+SX/4
    :Y=Y+SY/4
650 C1=POINT(X+4,Y-104)
    :C2=POINT(X+120,Y-104)
660 IF C1=10R C2=1
    THEN OVER=-1
670 IF C1=-10R C2=-1
    THEN SX=-SX
    :X=X+SGN (SX)
680 IF C1=1AND C2=1
    AND SY>-12
    THEN OVER=1
690 IF Y>1023
    THEN OVER=2
700 PROCSHIPPLOT
710 ENDPROC
720 DEF PROCCRASH1
730 FOR I=0TO 40
    :SOUND 0,-15,6,1
    :VDU 19,3,I MOD 13;0;
    :NEXT
740 ENDPROC
750 DEF PROCCRASH
760 SCORE=0
    :VDU 4
    :CLS
    :PRINT TAB(14)"You
     crashed!"
770 ENDPROC
780 DEF PROCSUCCESS
790 VDU 4
    :PRINT "    Well done,
     you managed to land
     usingonly ";1000-FUEL
    " litres of fuel."
800 IF FUEL<80
    THEN PRINT "    Unfort
    unately you do not
     have enoughfuel left
     to get back into orbit
    !"
810 SCORE=FUEL
820 ENDPROC
830 DEF PROCINSTRUCT
840 COLOUR 1
    :PRINT "  E";
    :COLOUR 3
    :PRINT "mergency"
850 COLOUR 1
    :PRINT "   L";
    :COLOUR 3
    :PRINT "unar"
860 COLOUR 1
    :PRINT "    E";
    :COLOUR 3
    :PRINT "scape"
870 COLOUR 1
    :PRINT TAB(5)"C";
    :COLOUR 3
    :PRINT "apsule"
880 COLOUR 1
    :PRINT TAB(6)"T";
    :COLOUR 3
    :PRINT "rial"
890 COLOUR 1
    :PRINT TAB(7)"R";
    :COLOUR 3
    :PRINT "un"
900 COLOUR 1
    :PRINT TAB(8)"O";
    :COLOUR 3
    :PRINT "n"
910 COLOUR 1
    :PRINT TAB(9)"N";
    :COLOUR 3
    :PRINT "ow"
920 COLOUR 2
    :PRINT TAB(10)"U";
    :COLOUR 3
    :PRINT "sing"
930 COLOUR 2
    :PRINT TAB(11)"S";
    :COLOUR 3
    :PRINT "uper"
940 COLOUR 2
    :PRINT TAB(12)"E";
    :COLOUR 3
    :PRINT "nergy"
950 COLOUR 2
    :PRINT TAB(13)"R";
    :COLOUR 3
    :PRINT "etromotors"
960 X=700
    :Y=1000
    :PROCINITIAL
    :ST=0
    :MT=0
    :VDU 5
    :PROCSHIPPLOT
    :VDU 8,18,3,2,237
    ,8,236,4
970 COLOUR 1
    :PRINT 'TAB(14)"INSTRUC
    TIONS"
980 COLOUR 2
    :PRINT '" Land the
     capsule safely on
     the moon's surface
     on a level area. The
     controls   are as
     follows,"
990 PRINT 'TAB(9)"'Z' for
     vertical thrust."
1000 PRINT 'TAB(9)"'<' for
     left thrust."
1010 PRINT 'TAB(9)"'>' for
     right thrust."
1020 COLOUR 1
     :PRINT ''TAB(10)"PRESS
      SPACE TO START"
     :VDU 5
1030 REPEAT UNTIL INKEY (-99)
1040 ENDPROC
1050 DEF PROCMOONSCAPE
1060 FUEL=1000
     :SY=0
     :SX=-1
1070 VDU 19,1,2;0;19,2
     ,4;0;19,3,1;0;
1080 GCOL 0,1
     :MOVE 0,0
     :X=0
     :Y=850
     :MOVE X,Y
1090 REPEAT
1100 X=X+RND(150)
     :Y=Y-RND(200)
1110 IF Y<1100R X>800
     THEN Y=100
1120 PLOT 85,X,0
     :PLOT 85,X,Y
1130 UNTIL Y=100
1140 X=X+120+RND(50)
1150 PLOT 85,X,0
     :PLOT 85,X,Y
1160 REPEAT
1170 X=X+RND(150)
     :Y=Y+RND(150)
1180 IF Y>8400R X>1279
     THEN Y=850
     :X=1279
1190 PLOT 85,X,0
     :PLOT 85,X,Y
1200 UNTIL Y=850
1210 X=1100
     :Y=1000
     :MT=0
     :ST=0
1220 COLOUR 129
     :COLOUR 2
     :PRINT TAB(3,29)"HOR.
      VER. FUEL"
     :COLOUR 3
1230 VDU 5
     :PROCSHIPPLOT
1240 ENDPROC
1250 DEF PROCORBIT
1260 PRINT "  You have put
     yourself back into
     orbit!"
     :SCORE=0
1270 ENDPROC
```

Moon Rescue listing

From Page 18

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are on Page 4.

```
 10 REM MOON RESCUE
 20 REM (C) ELECTRON USER
 30 REM By R.J.Arundale
 40 DIM ast$(3),isg%(5)
    ,hi$(5),hi%(5)
    :PROCinit
 50 MODE 6
    :PROCinst
    :MODE 1
    :VDU 23,1,0;0;0;0;
    :liv%=3
    :sc%=0
 60 FOR w%=1 TO 3
    :men%=0
    :pads%=0
    :A%=16
    :B%=1
    :PROCdisplay
 70 IF liv%=0
    THEN w%=3
    :GOTO 260
    ELSE IF pads%=4
    THEN 250
    ELSE TIME =0
 80 A%=A%+B%
    :IF A%=30
    THEN B%=-1
    ELSE IF A%=0
    THEN B%=1
 90 IF ADVAL (-5)>10
    THEN SOUND 0,2,0,20
100 COLOUR 3
    :PRINT TAB(A%,2);as$
    :PROCast
    :IF cr%=1
    THEN PROCcrash
    :GOTO 70
    ELSE *FX15,1
110 IF NOT INKEY (-1)
    AND as$=asb$ AND
    TIME <1500
    THEN 80
    ELSE IF as$=asb$
    THEN as$=asa$
    :X%=A%+4
    :Y%=2
120 UP%=FALSE
    :SOUND &10,-8,5,250
    :VDU 31,X%,Y%,32
    :Y%=Y%+1
130 IF INKEY (-98) AND X%>0

    THEN X%=X%-1
140 IF INKEY (-67) AND X%<39

    THEN X%=X%+1
150 IF POINT(X%*32+16,(31-Y%)
    *32+16)=1 OR POINT(X%*32+
    16,(31-Y%)*32-1)=3
    THEN PROCcrash
    :GOTO 70
160 COLOUR 3
    :VDU 31,X%,Y%,231
    :IF POINT(X%*32+16,(31-Y%
    )*32-1)<>2
    THEN 80
170 SOUND &0010,-15,3,30
    :TIME =0
    :REPEAT UNTIL TIME >150
    :sc%=sc%+RND(5)*100
    :pads%=pads%+1
    :COLOUR 2
    :PRINT TAB(6,0);sc%;
    TAB(X%-3,Y%+1);SPC (6);
    TAB(X%-3,Y%+2);SPC (6);
    TAB(39-pads%,31);" ";
180 SOUND &10,-8,5,250
    :A%=A%+B%
    :IF A%=30
    THEN B%=-1
    ELSE IF A%=0
    THEN B%=1
190 COLOUR 3
    :PRINT TAB(A%,2);as$
    :PROCast
    :IF cr%=1
    THEN PROCcrash
    :GOTO 70
    ELSE *FX15,1
200 UP%=TRUE
    :VDU 31,X%,Y%,32
    :Y%=Y%-1
210 IF INKEY (-98) AND X%>0

    THEN X%=X%-1
220 IF INKEY (-67) AND X%<39

    THEN X%=X%+1
230 IF POINT(X%*32+16,(31-Y%)
    *32+16)=1
    THEN PROCcrash
    :GOTO 70
    ELSE IF Y%>3
    THEN COLOUR 3
    :VDU 31,X%,Y%,231
    :GOTO 180
    ELSE IF POINT(X%*32+16
    ,(31-Y%)*32+32)=0
    PROCcrash
    :GOTO 70
240 VDU 17,2,31,X%,Y%,231
    :SOUND &0010,-15,3,30
    :TIME =0
    :REPEAT UNTIL TIME >150
    :sc%=sc%+w%*100
    :men%=men%+1
    :COLOUR 2
    :PRINT TAB(6,0);sc%
    :VDU 31,40-men%*2,0
    ,233;
250 IF pads%<4
    THEN PRINT TAB(0,2);
    SPC (80)
    :A%=16
    :as$=asb$
    :GOTO 70
    ELSE IF men%=4
    THEN sc%=sc%+500
    :PRINT TAB(10,15);"BONUS
     500 POINTS";TAB(6,0);sc%
    :TIME =0
    :REPEAT UNTIL TIME >350
260 men%=0
    :pads%=0
    :A%=16
    :as$=asb$
    :CLS
    :NEXT w%
    :IF liv%=0
    THEN 280
270 sc%=sc%+1000
    :liv%=liv%+1
    :A%=16
    :as$=asb$
    :COLOUR 2
    :PRINT TAB(5,15);"BONUS
     1000 POINTS + BONUS
     LANDER"
    :TIME =0
    :REPEAT UNTIL TIME >500
    :CLS
    :GOTO 60
280 IF sc%<=hi%(5)
    THEN 300
    ELSE PRINT TAB(10,3);
    "<135> Hi-score <135>"
    :K%=0
    :REPEAT K%=K%+1
    :UNTIL sc%>hi%(K%)
    :*FX 15,1
290 J%=6
    :REPEAT
    :J%=J%-1
    :hi%(J%)=hi%(J%-1)
    :hi$(J%)=hi$(J%-1)
    :UNTIL J%=K%
    :hi%(K%)=sc%
    :INPUT TAB(3,10)"Enter
     your name",hi$(K%)
    :hi$(K%)=LEFT$(hi$(K%)
    ,10)
300 CLS
    :PRINT TAB(10,2);"<135>
      HI-SCORES <135>"
    :FOR L%=1 TO 5
    :PRINT TAB(7,L%*4+4);L%;
    SPC (3);hi%(L%);SPC (4);h
    i$(L%)
    :NEXT
310 PRINT TAB(8,28);"Press
     the SPACE BAR"
    :REPEAT UNTIL GET =32
    :CLS
    :GOTO 50
320 VDU 23,1,1;0;0;0;
    :END
330 DEF PROCinit
    :VDU 23,1,0;0;0;0;
    :PROCchars
    :as$=asb$
    :X%=40
    :Y%=0
    :FOR K%=1 TO 5
    :hi$(K%)="THE ELECTRON"
    :hi%(K%)=1000
    :NEXT
340 ENVELOPE 1,1,10,10,30
    ,0,0,0,0,0,-1,-1,126
    ,0
    :ENVELOPE 2,5,-10,20
    ,-10,1,1,1,0,0,0,-127
    ,90,0
    :ENVELOPE 3,1,-1,0,0
    ,100,0,0,127,-2,0,0
    ,126,0
    :ENDPROC
350 DEF PROCast
    :COLOUR 1
    :cr%=0
    :K%=-1
    :REPEAT K%=K%+2
    :ast$(K%)=RIGHT$(ast$(K%)
    ,40-w%)+LEFT$(ast$(K%)
    ,w%)
```

```
    :PRINT TAB(0,K%*7);ast$(K
    %)
    :IF POINT(X%*32+16,(31-Y%
    )*32+16)=1
    THEN cr%=1
    :UNTIL cr%=1
    :ENDPROC
    ELSE UNTIL K%=3
360 K%=2
    :ast$(K%)=RIGHT$(ast$(K%)
    ,w%)+LEFT$(ast$(K%)
    ,40-w%)
    :PRINT TAB(0,14);ast$(K%)
    :IF POINT(X%*32+16,(31-Y%
    )*32+16)=1
    THEN cr%=1
    :ENDPROC
    ELSE ENDPROC
370 DEF PROCcrash
    :IF UP%
    THEN PROCfall
    ELSE *FX21,4
380 SOUND 0,1,6,10
    :K%=0
    :REPEAT K%=K%+1
    :VDU 17,4-K%,31,X%-1
    ,Y%-1,239,240,241,31
    ,X%-1,Y%,242,243,244
    ,31,X%-1,Y%+1,245,246
    ,247
    :TIME =0
    :REPEAT UNTIL TIME >50
    :UNTIL K%=3
390 VDU 31,X%-1,Y%-1,32
    ,32,32,31,X%-1,Y%,32
    ,32,32,31,X%-1,Y%+1
    ,32,32,32,31,liv%-1
    ,31,32
    :COLOUR 3
    :PRINT TAB(0,29);
    STRING$(40,CHR$ 225);
    TAB(0,2);SPC (80)
    :liv%=liv%-1
    :A%=16
    :X%=40
    :Y%=0
    :as$=asb$
    :ENDPROC
400 DEF PROCdisplay
    :PRINT TAB(3,15);"BONUS
    ";w%*100;" POINTS FOR
    EACH MAN RESCUED"
    :*FX21,6
410 RESTORE 610
    :REPEAT READ note%,len%
    :SOUND 1,-12,note%,len%
    :UNTIL len%=12
    :TIME =0
    :REPEAT UNTIL TIME >175
    :CLS
420 COLOUR 2
    :PRINT TAB(0,0);"SCORE
    ";sc%;TAB(17,0);"MOON
    RESCUE";TAB(2,27);pad$;
    TAB(13,27);pad$;TAB(24
    ,27);pad$;TAB(35,27);pad$
    :COLOUR 3
    :PRINT TAB(0,29);
    STRING$(40,CHR$ 225);
    TAB(A%,2);as$
430 K%=0
    :REPEAT K%=K%+1
    :VDU 31,K%-1,31,231
    :UNTIL K%=liv%
    :K%=34
    :REPEAT K%=K%+1
    :VDU 31,K%,31,233
    :UNTIL K%=38
    :GCOL 0,1
    :MOVE 0,980
    :DRAW 1279,980
    :K%=0
    :COLOUR 1
440 REPEAT K%=K%+1
    :isg%(1)=RND(10)
    :isg%(2)=RND(10)
    :isg%(3)=RND(10)
    :isg%(4)=RND(10)
    :isg%(5)=37-isg%(1)-isg%(
    2)-isg%(3)-isg%(4)
450 ast$(K%)=STRING$(isg%(1)
    ," ")+CHR$ 232+STRING$(is
    g%(2)," ")+CHR$ 232+
    STRING$(isg%(3)," ")+
    CHR$ 232+STRING$(isg%(4)
    ," ")+CHR$ 232+STRING$(is
    g%(5)," ")
    :PRINT TAB(0,K%*7);ast$(K
    %)
    :UNTIL K%=3
460 K%=-3
    :REPEAT K%=K%+5
    :VDU 31,K%,RND(4)+8*
    RND(2),232
    :UNTIL K%=37
    :ENDPROC
470 DEF PROCchars
    :VDU 23,225,255,255
    ,255,255,255,255,255
    ,255,23,226,255,127
    ,127,63,31,15,15,7,23
    ,227,255,255,254,254
    ,252,248,240,240,192
    ,23,228,3,3,1,0,0,0
    ,0,0,23,229,255,255
    ,255,255,255,126,126
    ,126,23,230,192,192
    ,128,0,0,0,0,0
480 VDU 23,231,56,124,254
    ,170,254,124,68,68,23
    ,232,24,126,126,255
    ,255,126,126,24,23,233
    ,0,56,56,16,124,16,40
    ,68,23,234,0,0,3,15
    ,31,63,127,231,23,235
    ,255,255,231,255,255
    ,255,255,24,23,236,0
    ,0,192,240,248,252,254
    ,231
490 VDU 23,237,231,127,63
    ,31,15,3,0,0,23,238
    ,231,254,252,248,240
    ,192,0,0,23,239,0,0
    ,0,0,0,4,2,1,23,240
    ,0,0,0,16,84,56,16,17
    ,23,241,0,0,0,0,0,64
    ,128,0,23,242,0,8,4
    ,31,4,8,0,1,23,243,146
    ,84,56,255,56,84,146
    ,17
500 VDU 23,244,0,32,64,240
    ,64,32,0,0,23,245,2
    ,4,0,0,0,0,0,0,23,246
    ,16,56,84,16,0,0,0,0
    ,23,247,128,64,0,0,0
    ,0,0,0,23,248,0,90,74
    ,126,24,60,36,36
510 pad$=CHR$ 226+CHR$ 225+
    CHR$ 227+CHR$ 10+
    CHR$ 8+CHR$ 8+CHR$ 8+
    CHR$ 228+CHR$ 229+
    CHR$ 230
    :asa$=CHR$ 32+CHR$ 234+
    STRING$(5,CHR$ 235)+
    CHR$ 236+CHR$ 32+
    CHR$ 10+STRING$(9,
    CHR$ 8)+CHR$ 32+CHR$ 237+
    STRING$(5,CHR$ 32)+
    CHR$ 238+CHR$ 32
520 asb$=CHR$ 32+CHR$ 234+
    STRING$(5,CHR$ 235)+
    CHR$ 236+CHR$ 32+
    CHR$ 10+STRING$(9,
    CHR$ 8)+CHR$ 32+CHR$ 237+
    CHR$ 32+CHR$ 32+CHR$ 231+
    CHR$ 32+CHR$ 32+CHR$ 238+
    CHR$ 32
    :ENDPROC
530 DEF PROCfall
    :COLOUR 3
    :VDU 31,X%,Y%,231
    :*FX21,4
540 SOUND 1,3,230,30
    :K%=Y%+1
    :REPEAT
    :K%=K%+1
    :VDU 31,X%,K%,248
    :TIME =0
    :REPEAT UNTIL TIME >5
    :VDU 31,X%,K%,32
    :UNTIL POINT(X%*32+16
    ,(31-K%)*32-16)<>0
    :SOUND 1,0,0,1
    :SOUND 0,-15,4,2
    :ENDPROC
550 DEF PROCinst
    :PRINT TAB(10);"MOON
    RESCUE"
    :PRINT TAB(10);"MOON
    RESCUE"
560 PRINT '" A party of lunar
    explorers are strandedon
    the moon.You have to
    descend from  your
    ship and land on one
    of the four  landing
    pads."
570 PRINT " You then carry
    the explorer back up
    to your ship.As there
    are four explorers,
     you must do this four
    times to clear thesheet.
    "
580 PRINT " By the way,watch
    out for the asteroids!"
590 PRINT '" Controls :"'
    " 'SHIFT' . . . . to
    drop out of ship"'"
      'Z'  . . . . to move
    left"'"  'X'  . .
    . . to move right"'
600 PRINT "Press the SPACE
    BAR to start"
    :REPEAT UNTIL GET =32
    :ENDPROC
610 DATA 100,3,118,4,131
    ,3,119,4,123,3,111,4
    ,119,7,103,3,91,4,75
    ,3,91,4,83,3,99,4,103
    ,12
```

This listing is included in this month's cassette tape offer. See order form on Page 9.

Tower of Hanoi listing

From Page 27

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are on Page 4.

```
 10 REM TOWERS OF HANOI
 20 REM by Denis R Smith
 30 REM (C) ELECTRON USER

 40 ENVELOPE 1,4,-7,7,0
    ,10,10,0,126,0,0,-126
    ,126,126
    :ENVELOPE 2,1,-7,7,0
    ,10,10,0,126,0,0,-126
    ,126,126
 50 *KEY10"OLD|MRUN|M"
 60 DIM disc%(5,14)
    :DIM level%(5)
    :DIM x%(3)
    :DIM y%(2)
    :DIM move%(14)
    :e%=0
    :q=0
 70 ON ERROR GOTO 290
 80 MODE 1
    :VDU 19,3,6,0,0,0
 90 PROCdisc(600,100,30
    ,0)
    :PROCdemo
100 REPEAT
110 *FX15,0
120 PROCchoose
    :IF name$="END"
    THEN END
130 PROCinit
    :PROCdisplay
140 REPEAT
150 *FX15,0
160 PROCinput
    :PROCtransfer(from%
    ,to%)
    :PROCmove(from%,to%)
170 IF e%=0
    THEN 200
180 IF move%(e%)=FALSE
    AND score%)(2^(e%-1)+e%)
    THEN PROCoffer
    :move%(e%)=TRUE
190 IF struggle%=TRUE
    THEN 220
200 UNTIL level%(1)=8
210 GOTO 250
220 UNTIL struggle%=TRUE
230 IF q=3
    THEN PROCbeebgo
    :PRINT
    :PRINT "Another game?"
    :GOTO 110
240 IF q=2
    THEN 130
250 game=0
260 FOR test%=2TO 3
    :IF level%(test%)=1
    THEN game=1
270 NEXT
    :IF game=1
    THEN PROCfinish
    ELSE GOTO 140
280 UNTIL 6=7
290 IF ERR =13
    THEN 100
300 REPORT
    :PRINT " @ line ";
    ERL
    :PROCWAIT(2000)
    :GOTO 100
310 DEF PROCtransfer(old%
    ,new%)
320 x%(1)=240+384*(old%-1)
    :x%(2)=240+384*(new%-1)
    :y%(1)=592+16*(7-(level%(
    old%)))
    :y%(2)=608+16*(7-(level%(
    new%)))
330 d%=disc%(old%,level%(old%
    ))
    :e%=disc%(old%,level%(old
    %)+1)
    :x%(3)=(x%(2)+x%(1))/2
340 move%(d%)=TRUE
350 PROCdisc(x%(1),y%(1)
    ,d%,1)
    :IF level%(old%)=7
    THEN PROCbottompole
    :GOTO 370
360 PROCdisc(x%(1),y%(1)-16
    ,e%,0)
370 SOUND 1,-(d%+4),y%(1)-524
    ,3
    :PROCdisc(x%(3),932
    ,d%,0)
    :PROCWAIT(50)
    :PROCdisc(x%(3),932
    ,d%,1)
    :SOUND 1,-(d%+4),y%(2)-52
    4,3
380 VDU 25,4,x%(3);900;25
    ,3,0;52;25,0,4;-52;25
    ,3,0;52;25,0,-8;-52;25
    ,3,0;52;
390 PROCWAIT(25)
    :PROCdisc(x%(2),y%(2)
    ,d%,0)
400 ENDPROC
410 DEF PROCdemo
420 PROCpoles
    :VDU 28,1,30,37,16
    :COLOUR 1
    :COLOUR 130
    :CLS
430 FOR N%=7TO 1STEP -1
    :PROCdisc(240,592+16*(7-N
    %),N%,0)
440 SOUND 1,-12,16*(10-N%)
    ,5
    :PROCWAIT(N%*100)
    :NEXT
450 PRINT
    :PRINT "  The object
     of this game is to move
     all the discs onto anoth
    er tower in  as few moves
     possible!"
460 PRINT
    :PROCWAIT(600)
470 ENDPROC
480 DEF PROCdisc(X%,Y%,D%
    ,col)
490 GCOL 0,1
    :L%=32+16*D%
    :IF col=1
    THEN GCOL 0,0
500 VDU 25,4,X%+16+8*D%;Y%+16
    ;25,0,0;-32;25,81,-L%;0;2
    5,0,0,0,16,0,25,81,-16;-8
    ;25,0,-8;8;25,81,24
    ,0,0,0,25,81,-16;8;25
    ,81,16,0,8,0,25,0,0;-32;2
    5,81,L%;32;25,0,0;-16;25
    ,81,16,0,8,0
510 VDU 25,81,8;-8;25,0
    ,-8;-8;25,81,-16;8;25
    ,81,0;-16;18,0,2
    :IF col=1
    THEN GCOL 0,0
520 VDU 25,1,-L%;0;25,1
    ,-16;8;25,1,-8;8;25
    ,1,8,0,8,0,25,1,16;-8;25
    ,1,L%;0;25,1,16,0,8
    ,0,25,1,8;-8;25,1,-8;-8;2
    5,1,-16;-8;25,4,X%;Y%+4;1
    8,0,3,25,1,0,0,12,0
    ,25,0,-4;0;25,1,0;-(8+(co
    l*8));25,0,8,0,0,0,25
    ,1,0;(8+(col*8));
530 IF col=1
    THEN VDU 25,0,-4;0;25
    ,1,0;-16;
540 ENDPROC
550 DEF PROCpoles
560 GCOL 0,3
570 FOR X%=240TO 1008
    STEP 384
580 MOVE X%,896
    :DRAW X%,576
    :MOVE X%-4,576
    :DRAW X%-4,896
    :MOVE X%+4,896
    :DRAW X%+4,576
590 NEXT
600 MOVE 1200,572
    :DRAW 48,572
    :MOVE 48,568
    :DRAW 1200,568
    :MOVE 1200,564
    :DRAW 48,564
610 VDU 5
    :GCOL 0,3
    :MOVE 392,992
    :PRINT "TOWERS OF HANOI"
    :MOVE 392,984
    :GCOL 0,2
    :PRINT "---------------"
    :VDU 4
620 ENDPROC
630 DEF PROCbottompole
640 VDU 18,0,3,25,4,x%(1);608
```

→

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Tower of Hanoi listing

From Page 56

```
    ;25,1,0;-32;25,0,-4;0;25
    ,1,0,0,32,0,25,0,8,0
    ,0,0,25,1,0;-32;25,4
    ,1200;572;25,5,48;572;25
    ,4,48;568;25,5,1200;568;2
    5,4,1200;564;25,5,48;564;
650 ENDPROC
660 DEF PROCWAIT(w)
    :FOR W=1 TO w
    :NEXT
    :ENDPROC
670 DEF PROCtune(m%)
680 RESTORE 710
690 FOR n%=1 TO 16
    :READ e%,o%
    :NEXT
    :PROCWAIT(5000)
700 ENDPROC
710 DATA 4,53,0,53,4,m%
    ,0,1,4,81,4,81,4,81
    ,4,73,4,m%,4,61,4,53
    ,4,61,4,53,4,53,4,53
    ,3,53
720 DEF PROCchoose
730 SOUND 1,3,0,40
    :PRINT
    :INPUT "Enter your name:
     "name$
    :L=LEN (name$)
740 IF L>39
    THEN PRINT '"*   Too
     long!"
    :GOTO 730
750 IF name$="END"
    THEN ENDPROC
760 V=ASC (LEFT$(name$,1))
    :IF V>96 AND V<123
    THEN V=V-32
770 N$=CHR$ (V)
    :FOR J=2 TO L
    :V=ASC (MID$(name$,J
    ,1))
    :IF V>64 AND V<91
    THEN V=V+32
780 N$=N$+CHR$ (V)
    :NEXT
    :name$=N$
790 IF L<2
    THEN name$="Noddy"
800 ENDPROC
810 DEF PROCinit
820 score%=0
    :D$="N"
    :struggle%=FALSE
    :q=1
830 FOR d%= 1 TO 7
    :disc%(1,d%)=d%
    :move%(d%)=FALSE
    :FOR n%=2TO 3
    :disc%(n%,d%)=0
    :level%(n%)=8
    :NEXT
    :NEXT
    :level%(1)=1
    :FOR n%=1TO 3
    :disc%(n%,8)=0
    :NEXT
840 ENDPROC
850 DEF PROCdisplay
860 CLG
    :PROCpoles
870 FOR N%=7TO 1STEP -1
    :PROCdisc(240,576+16*(8-N
    %),N%,0)
880 SOUND 1,-13,4*(30-N%)
    ,3
    :NEXT
890 ENDPROC
900 DEF PROCinput
910 PRINT
920 PRINT "Move top disc
     from
        tower number....";
    :from%=VAL (GET$ )
    :PRINT from%
930 IF from%<1 OR from%>3
    THEN PRINT '"You only
     have 3 towers!"
    :SOUND 1,2,100,35
    :GOTO 920
940 IF level%(from%)>7
    THEN PRINT "But there's
     no disc on tower ";from%
    ;" !"
    :SOUND 1,2,175,65
    :GOTO 920
950 p%=68+16*(7-(level%(from%
    )))
    :SOUND 1,-8,p%,3
    :PRINT "To tower number..
    .."
    :to%=VAL (GET$ )
    :PRINT to%
960 IF to%<1 OR to%>3
    THEN PRINT '"You only
     have 3 towers!"
    :SOUND 1,2,100,35
    :GOTO 950
970 IF level%(to%)=8
    THEN 1000
980 IF disc%(from%,level%(fro
    m%))>disc%(to%,level%(to%
    ))
    THEN PRINT "You're not
     allowed to put a
           larger disc on
     top of a smaller one!"
    :SOUND 1,1,50+RND(100)
    ,4
    :GOTO 920
990 IF from%=to%
    THEN PRINT "Are you sure?
    "
    :SOUND 1,1,40,4
    :GOTO 920
1000 ENDPROC
1010 DEF PROCmove(old%,new%)
1020 level%(new%)=level%(new%)
     -1
     :disc%(new%,level%(new%))
     =disc%(old%,level%(old%))
1030 disc%(old%,level%(old%))=
     0
     :level%(old%)=level%(old%
     )+1
     :score%=score%+1
1040 ENDPROC
1050 DEF PROCfinish
1060 PRINT
     :PRINT "Well done, ";name
     $;" !"
1070 PRINT "You took ";score%;
     " moves."
1080 IF score%>132
     THEN PROCtune(65)
     ELSE PROCtune(69)
1090 PRINT
1100 PRINT "Best possible
      score is 127."
     :PRINT "Do you want a
      demonstration"
     :PRINT "Y/N?"
     :C$=GET$
1110 IF C$="y" OR C$="Y"
     THEN PROCbeebop
1120 PRINT
     :PRINT "Now for the next
      game!"
1130 PRINT
     :PRINT
1140 ENDPROC
1150 DEF PROCbeebop
1160 PROCdisplay
     :PROCinit
     :PROCWAIT(500)
1170 T%=0
     :PROChanoi(7,1,2,3)
1180 ENDPROC
1190 DEF PROChanoi(P%,O%
     ,R%,S%)
1200 IF P%=0
     THEN ENDPROC
1210 PROChanoi(P%-1,O%,S%
     ,R%)
1220 T%=T%+1
     :PRINT T%
1230 PROCtransfer(O%,R%)
     :PROCmove(O%,R%)
1240 PROCWAIT(100)
1250 PROChanoi(P%-1,S%,R%
     ,O%)
1260 ENDPROC
1270 DEF PROCoffer
1280 struggle%=FALSE
1290 PRINT '"You seem to be
      struggling."
1300 PRINT "Do you want to:"
1310 PRINT "   1  Carry on."
1320 PRINT "   2  Start again,
     "
1330 PRINT "   3  Stop and
      have a demonstration."
1340 PRINT
     :PRINT "   1,2, or3?"
1350 q=VAL (GET$ )
     :IF q<1OR q>3
     THEN 1300
1360 IF q>1
     THEN struggle%=TRUE
1370 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 9.

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```
10 REM SITS VAC
20 IF you can write
   intelligible English
30 AND you can create
   brilliant programs
40 IF you are capable
   of working with a
   bunch of lunatics
50 THEN you might be
   the person we need.
60 IF you want to be an
   editorial assistant
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   Electron User
70 THEN send your
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```

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Micro messages

Kitty on the keys

I KNOW this sounds daft, but when I'm using my Electron my cat becomes fascinated by what I'm doing and hits the keys with his paw.

He's also been known to sit on the keyboard! Will this harm the Electron? – **Julie Morris, Hillsborough, Sheffield.**

● It depends how hard he hits the keyboard! If we were you we'd be more worried about the effects of cat hairs getting in the works.

Discourage the moggy! One of the hacks from Micro User tells us that his Tabby falls asleep on top of the monitor when he's using his micro to write his articles. That explains a lot!

GOTO guidelines

THE other day I was proudly showing off a program that I had written all by myself and the person I showed it to said I'd done it wrong.

He said I shouldn't have used the GOTO keyword. Why shouldn't I? My program worked well enough with it.

Why is GOTO in the books if you aren't supposed to use it? – **Sue Woodcock, High Wycombe, Bucks.**

● We were dreading this one coming up! Yes, you can use GOTO and it will work and we can't see anything wrong in that.

The point is that when your programs get longer and more complicated, using a lot of GOTOs can make them very difficult to sort out.

There are ways of avoiding using them – and GOSUB as well – which make the program easier to sort out if things so wrong.

Doing this is known as "structured" programming and we'll be covering it in future issues.

As it is don't worry. Everyone uses GOTOs at some time or other.

Which O.S.?

I'VE been told that my Electron has more or less the same operating system as the BBC Micro. I've also been told that there have been three versions of the Beeb – OS 0.1, 1.0 and 1.2.

Which have I got in my Electron? – **Chris Pace, Didsbury, Manchester.**

● Have no fear, Chris. In your micro is the latest and final version of the OS – 1.2.

You might also be pleased to know that your Electron has Basic II, an improved version of the language that, even now, some BBC Micro owners aren't getting.

WP on the Electron

YOU'VE started a really fantastic magazine. Keep up the good work!

Can you tell me, is it possible to turn my Electron into a word processor? I know it's possible on the BBC Micro so is the Electron the same? – **Tom Kent, Carlisle, Cumbria.**

● At the moment you can't use the Electron for word processing because it doesn't have a port that will allow it to use a printer.

Almost most of the word processor packages for the BBC Micro use Mode 7 which the Electron lacks.

Having said that it won't be long until there are hardware add-ons that will allow you to do this.

Machine code

WHAT is machine code and what is it used for? I want to write my own games and I've been told that I'll have to use machine code to do it. Is this true? – **T.R. Owen, Swansea.**

● You could write a book about what machine code is. In fact many people already have.

To put it simply machine code is the language that the Electron actually works in.

When you write a program in Basic the micro translates it into machine code, line by line.

A whole series on machine code is on the drawing board for future issues of *Electron User*.

As for having to use machine code for games, the answer is that you can write good games in Basic, as the listings in this issue will show.

Hangman hang up

HELP! I've been trying to get your Hangman program to work and it won't! I know I'm a beginner but I've been really careful and checked every line and I still get problems at line 170.

Is there a mistake in your listings? – **Tim Sharratt, Southall, Middlesex.**

● It's sackcloth and ashes time here because we DID make a mistake. Part of line 170 was cut out by accident and, as you've found, it won't work without it.

We were going to hang the guy who actually did it, but instead we've sent him to work on Micro User for six months – a much worse fate.

For those of you who haven't been put off Hangman for life the correct version of line 170 is:

```
170 IF word$=
    STRING$(length%," *)
    THEN PROCwon
    ELSE IF correct%=
    TRUE GOTO 80
    ELSE err%=err%+1
    :PROChang
    :IF err%<8
    THEN 80
```

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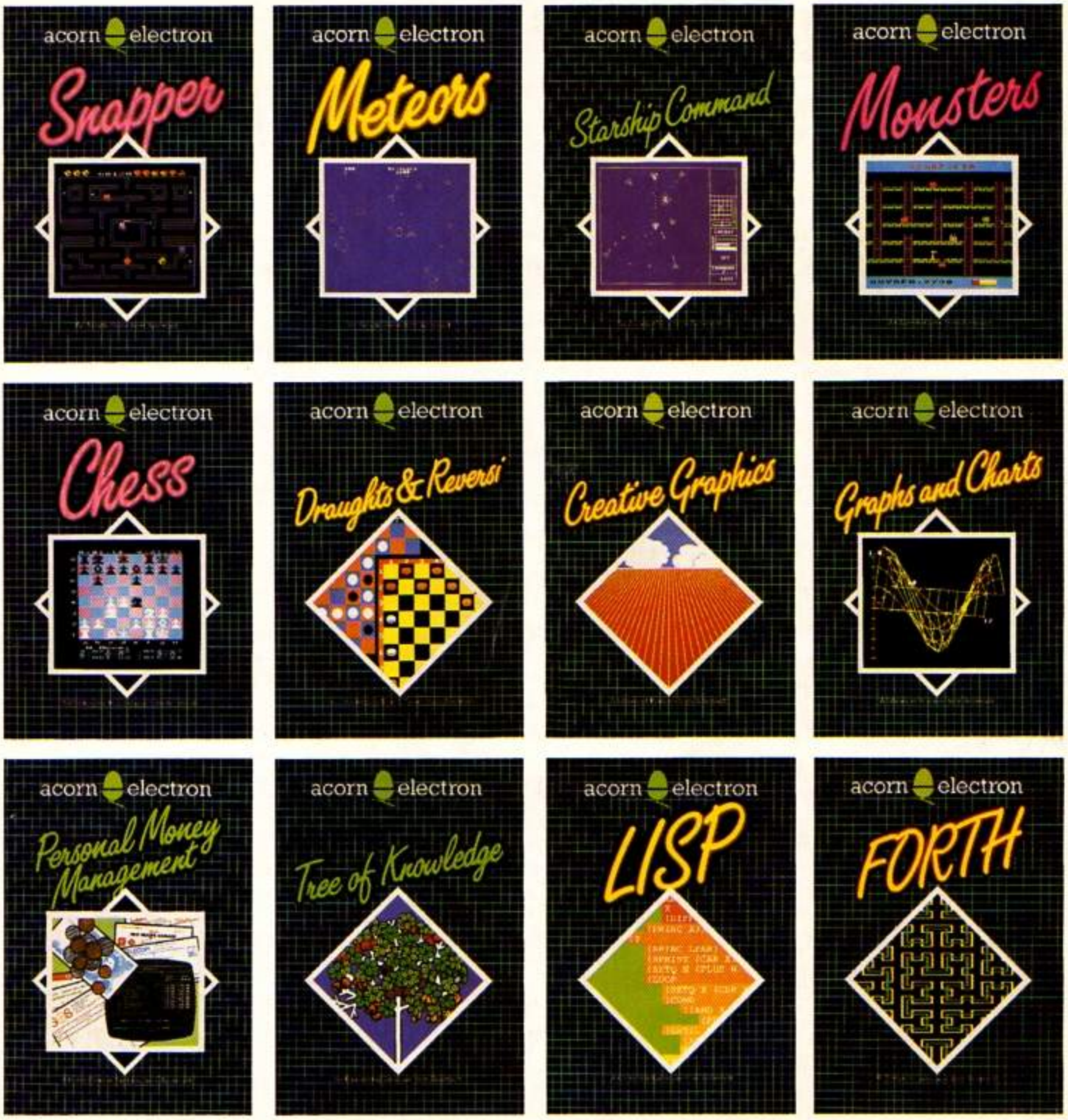

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